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QUARTERLY MONITORING ANNUAL REPORT, LONG-TERM MONITORING SOLDIER CREEK SEDIMENT AND SURFACE WATER OPERABLE UNIT TINKER AFB OKLAHOMA CITY, OKLAHOMA

CONTRACT NO.
F34650-93-D-0109
ORDER 5005

Prepared for
Department of the Air Force
Tinker AFB
Oklahoma City, Oklahoma

April 1997

Woodward-Clyde
Engineering & sciences applied to the earth & its environment

April 21, 1997
WCFS Project No. F93506

Department of the Air Force
Headquarters Oklahoma City Air Logistics Center (AFMC)
OC-ALC/PKOSS
ATTN: Sharon Beatty
7858 5th Street, Suite 1
Tinker AFB, Oklahoma 73145-9106

Subject: Submittal of Final Quarterly Monitoring Annual Report
Long-Term Monitoring of Soldier Creek
Contract No. F34650-93-D-0109, Order No. 5005
WCFS Document Control No. F93506.118

Dear Ms. Beatty:

This letter transmits twelve copies of the Final Quarterly Monitoring Annual Report. No revisions have been made to the document. Eleven copies of the revisions were delivered to James Dawson.

If you have any questions regarding this submittal, please contact the undersigned.

Sincerely,

Daphne D. Nickisch
Senior Staff Scientist

Charles M. Johnson
Project Manager

Woodward-Clyde Federal Services • A subsidiary of Woodward-Clyde Group, Inc.
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FINAL

[redacted]

QUARTERLY MONITORING ANNUAL REPORT, LONG-TERM MONITORING OF SOLDIER CREEK SEDIMENT AND SURFACE WATER OPERABLE UNIT TINKER AFB OKLAHOMA CITY, OKLAHOMA

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FINAL

QUARTERLY MONITORING ANNUAL REPORT

FOR LONG-TERM MONITORING OF SOLDIER CREEK

SEDIMENT AND SURFACE WATER OPERABLE UNIT

Document Prepared for:

Tinker Air Force Base
Environmental Directorate
OC-ALC/EM
Tinker AFB, Oklahoma

405-734-3058

This Final Quarterly Monitoring Annual Report incorporates sediment and surface water data collected by Woodward-Clyde Federal Services during the first year of quarterly monitoring, a human health risk assessment, and a summary of groundwater data collected in 1995 as it relates to the Soldier Creek Sediment and Surface Water Operable Unit.

Outline of Document

- Introduction
- Background
- Investigation Methods
- Human Health Risk Assessment
- Discussion of Quarterly Monitoring Results
- Review of Groundwater
- Conclusions and References

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AOC	Area of Concern
ACC	Air Combat Command
AFB	Air Force Base
AFMC	Air Force Materiel Command
bgs	Below Ground Surface
BHRA	Baseline Health Risk Assessment
CAA	Clean Air Act
CERCLA	Comprehensive Emergency Response and Compensation Liability Act
CWA	Clean Water Act
DERP	Defense Environmental Restoration Program
DoD	Department of Defense
DRMO	Defense Reutilization and Marketing Office
EM	Environmental Management
EPA	Environmental Protection Agency
FFA	Federal Facilities Agreement
HEAST	Health Effects Assessment Summary Tables
HHRA	Human Health Risk Assessment
HI	Hazard Indices
HPLC	High Performance Liquid Chromatography
IRP	Installation Restoration Program
IRIS	Integrated Risk Information System
I-40	Interstate Highway 40
IWTP	Industrial Wastewater Treatment Plant
MCL	Maximum Contaminant Level
NCP	National Contingency Plan
NPDES	National Pollution Discharge Elimination System
NPL	National Priority List
OSDH	Oklahoma State Department of Health
OU	Operable Unit
PAH	Polyaromatic Hydrocarbon

PCB	Polychlorinated Biphenyl
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SARA	Superfund Amendment and Reauthorization Act
STP	Sanitary Treatment Plant
SVOC	Semivolatile Organic Compounds
SWMU	Solid Waste Management Unit
TCE	Trichloroethene
TIC	Tentatively Identified Compound
TSCA	Toxic Substance Control Act
VOC	Volatile Organic Compound
USAF	United States Air Force
WCFS	Woodward-Clyde Federal Services

Quarterly monitoring of the Sediment and Surface Water Operable Unit of Soldier Creek at Tinker Air Force Base was conducted in response to the signed Record of Decision (ROD), dated September, 1993. The focus of this monitoring program was to evaluate sediment and surface water contamination from the Soldier Creek Sediment and Surface Water Operable Unit from the headwaters of East and West Soldier Creeks to Interstate Highway 40.

Surface water samples were collected prior to sediment sampling. Sediment samples were collected at three intervals from 0-6 inches, 6-12 inches and 3-5 feet below ground surface (bgs). When refusal of the sampling device occurred prior to 5 feet bgs, a sediment sample was typically collected from the bottom one foot interval of the boring. Quarterly monitoring occurred in November 1994, and January, April and June 1995.

During the first year of quarterly monitoring, a total of 137 sediment and 59 surface water samples were collected from 17 segments on East and West Soldier Creeks and a sample location on Tributary B. Samples were analyzed for volatile organics, semi-volatile organics, metals, polychlorinated biphenyls and pesticides. Surface water measurements performed in the field included temperature, pH, conductivity, dissolved oxygen, and flow.

An evaluation of risks associated with Soldier Creek surface water and sediments was previously performed by B&V in the Baseline Health Risk Assessment (BHRA). A Human Health Risk Assessment (HHRA) was performed as part of this project to provide information on potential current and future risks based on current surface water and sediment contaminant levels, compare the results with those of the BHRA to see if the previous conclusions are still valid, and develop cleanup goals that are protective of the human populations.

Analyte concentrations detected in the sediment and surface water were screened using the screening criteria set forth in the ROD. Screening criteria were based on exposure factors developed by the BHRA for human health under the RI/FS, and the HHRA based on current monitoring results. Unacceptable exposures were determined based on the following criteria:

- Contaminant concentrations in sediment or surface water exceeding health levels based on an excess lifetime cancer risk of 10^{-4}.

- Contaminant concentrations in sediment or surface water with non-carcinogenic hazard indices (HIs) greater than 1.0

Contaminant concentrations detected in the 10^{-4} to 10^{-6} range may potentially indicate an unacceptable exposure level and were also evaluated.

Surface water analyte concentrations from the first year of quarterly monitoring did not exceed any of the screening criteria set forth in the BHRA and the HHRA.

Sediment analyte concentrations from the first year of quarterly monitoring did not exceed the 10^{-4} screening criteria set forth in the BHRA and the HHRA. Therefore, according to the ROD, because contaminants of concern did not exceed the 10^{-4} screening criteria another alternative for remediation does not need to be evaluated.

BHRA 10^{-6} screening criteria were exceeded by six polyaromatic hydrocarbons (PAHs) (benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, and indeno(1,2,3-cd)pyrene). HHRA 10^{-6} screening criteria were exceeded by two pesticides (aldrin and heptachlor) and six semivolatiles (benzidine, benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene), and HHRA 10^{-5} screening criteria were exceeded by one pesticide (heptachlor), and one PAH (benzo(a)pyrene) in sediment samples. Based on the ROD, exceedance of these 10^{-5} and 10^{-6} screening criteria may potentially indicate a need to evaluate if the exposure is unacceptable.

Despite slight difference in approach, both the BHRA and HHRA concluded that there are no unacceptable cancer risks or non-carcinogenic hazards associated with exposure to West or East Soldier Creeks for any on-base or off-base populations, under current or future stream use conditions. Thus no remedial action appears to be warranted based on risks to human health.

1.0
INTRODUCTION

1.1 PURPOSE OF REPORT

Quarterly Monitoring of the Sediment and Surface Water Operable Unit of Soldier Creek at Tinker Air Force Base (Tinker AFB) was conducted in response to the signed Record of Decision (ROD), dated September, 1993. This work was performed under Contract No. F34650-93-D-0109, Order 5005 between Tinker AFB and Woodward-Clyde Federal Services (WCFS). Quarterly monitoring occurred in November 1994, and January, April and June 1995. This report describes the sampling methods, analytical results, and conclusions of the investigation.

1.2 REGULATORY BASIS

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 and the Superfund Amendments and Reauthorization Act (SARA) of 1986 established the Defense Environmental Restoration Program (DERP) for the U.S. Department of Defense (DoD) to clean up past hazardous waste disposal and spill sites nationwide. In 1980, the United States Air Force (USAF) began implementing the DoD Installation Restoration Program (IRP). The IRP is designed to identify and evaluate suspected problems associated with past hazardous waste management practices, including impacts on human health and the environment.

Section 105 of SARA mandates that procedures for undertaking response actions follow the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) as promulgated by the U.S. Environmental Protection Agency (EPA).

Two sites located within Tinker AFB, Building 3001 and Soldier Creek, were listed on the CERCLA National Priority List (NPL) in 1987. Tinker AFB, EPA Region VI, and the Oklahoma State Department of Health (OSDH) signed a Federal Facilities Agreement (FFA) (Administrative Docket Number NPL-U3-2-27) under Section 120 CERCLA in December 1988. The intent of this agreement is to ensure that past and present activities of Tinker

AFBs NPL sites are thoroughly investigated and appropriately remediated to protect the public health, welfare, and the environment.

1.3 INVESTIGATION SCOPE AND OBJECTIVES

The focus of this monitoring program is sediment and surface water contamination from the Soldier Creek Sediment and Surface Water Operable Unit (OU) from the headwaters of East and West Soldier Creeks to Interstate Highway 40 (I-40). The Soldier Creek OU is located in the northeast portion of Tinker AFB and was identified in the ROD as a potential threat to human health and the environment. The objective of quarterly monitoring is to evaluate analytical results of sediment and surface water samples for exceedance of health based cleanup goals developed during the Baseline Health Risk Assessment (BHRA) (B&V, 1993a), and reported in the ROD (B&V, 1993b).

Quarterly monitoring of sediment and surface water began in November 1994 and proceeded until July 1995 at approximately 3 month intervals. Results of monitoring are included in this report. Sediment samples were collected at three intervals from 0-6 inches, 6-12 inches and 3-5 feet. When refusal of the sampling device occurred prior to 5 feet below ground surface (bgs), a sample was typically collected from the bottom one foot interval of the boring.

1.4 REPORT ORGANIZATION

This report describes the results of the first year of quarterly monitoring of the Soldier Creek OU.

Section 1 is the introduction describing the purpose of this report, the regulatory basis of the study, and the objectives and scope of the monitoring program.

Section 2 describes Tinker AFB and the project site. This section also summarizes site history and previous investigations.

Section 3 describes sampling methods used during quarterly monitoring of sediments and surface water.

Section 4 contains a brief summary of the Human Health Risk Assessment presented in Appendix A.

Section 5 contains a review and discussion of quarterly sampling results and analytical exceedances of screening criteria.

Section 6 contains a review of groundwater data from the Remedial Investigation (RI) conducted on the Soldier/Off-Base Groundwater Operable Unit and subsequent quarterly groundwater monitoring for 1995.

Section 7 presents conclusions from the first year of quarterly monitoring.

Section 8 presents the list of references cited.

2.1 INSTALLATION DESCRIPTION AND HISTORY

Tinker AFB is located in Oklahoma County in central Oklahoma approximately 8 miles southeast of downtown Oklahoma City. The base is bounded by Sooner Road to the west, Douglas Boulevard to the east, I-40 to the north, and Southeast 74th Street to the south. The base is comprised of 5,277 acres. Municipalities of the metro area which adjoin Tinker AFB are Midwest City to the north, Del City to the northwest, and Oklahoma City to the east, south, and southwest (Figure 2-1). Midwest City and Del City are heavily populated with mixed residential and commercial areas. The area under Oklahoma City jurisdiction is lightly developed residential.

To attract the war industries in the early 1940's, Oklahoma City donated the land required for the facility and offered necessary improvements at no cost to the War Department. The Oklahoma Industries Foundation was established to bid for a military maintenance and supply depot and to acquire the land for the site. Oklahoma City was considered a favorable location for the depot for several reasons, including mild winters, flat terrain, and strategic location near the geographic center of the United States. During this period, Midwest City was formed as a new town to provide housing and community facilities for the air depot. The original site, consisting of 960 acres, was selected by the Army on May 21, 1941, seven months before the United States officially entered World War II.

The name designations for the Oklahoma City Air Depot and Tinker Air Field have changed several times over the life of the base, as the depot and air base were redesignated and reorganized. Tinker AFB was officially known as Midwest Air Depot during its construction, and then as the Oklahoma City Air Depot after it was activated. In January 1943, the name of the depot was officially changed to Oklahoma City Air Depot Control Area Command. In May 1943, the name was changed to Oklahoma Air Technical Area Service Command to reflect new responsibilities at the depot. The name changed again in July 1946, to Oklahoma City Air Material Area. In 1974, the depot was redesignated Oklahoma City Air Logistic Center to reflect the last change in function at the depot.

Pressure from local citizens was instrumental in the decision to name the air field at the depot "Tinker Field", honoring General Clarence L. Tinker. Tinker was an Osage Indian who died in 1942 while leading a bomber strike against the Japanese at Wake Island. Following the creation of the DoD and the Air Force as a separate military establishment, Tinker Field became "Tinker Air Force Base" on January 13, 1948. Subsequently, the base became the worldwide repair depot for B-36 and B-45 aircraft, as well as a multitude of other weapons and engines.

The Oklahoma City Air Depot was partially operational in 1942. Tinker Air Field was built adjacent to and concurrently with the depot. The Douglas Cargo Airplane Plant was built in 1942-1943 to manufacture specially modified DC-3s. The depot and aircraft plant shared Tinker Air Field. After World War II, the Douglas Cargo Aircraft Plant was closed and the Air Depot took over the buildings and expanded the Base operations, to include facilities for testing and overhauling jet engines. During this time, Tinker AFB became involved in jet engine overhaul and, later, modification of aircraft from storage as part of a massive program to rebuild the nation's air power.

An important development during the 1980s was the increased emphasis on environmental management. In 1985, a separate Directorate of Environmental Management (EM) was formed. The new Directorate incorporated functions related to environmental laws such as the Clear Air Act (CAA), Clean Water Act (CWA), Resource Conservation and Recovery Act (RCRA), CERCLA as amended by SARA, and Toxic Substances Control Act (TSCA).

As early as 1983, measures to clean up sites at Tinker AFB contaminated by past activities were being undertaken under the Air Force IRP. Two sites, Building 3001 and Soldier Creek were listed on the CERCLA NPL in 1987. In 1988, Tinker AFB signed the FFA with EPA and the State of Oklahoma to remediate these sites. A RCRA Facility Assessment (RFA) conducted in May 1989 identified 105 Solid Waste Management Units (SWMUs) and nineteen Areas of Concern (AOCs). The base was issued a RCRA Part B permit on July 1, 1991. The permit specified that a RCRA Facility Investigation (RFI) be conducted for forty-three SWMUs and two AOCs. The Directorate of Environmental Management has now grown to approximately eighty personnel and works closely with the Bioenvironmental Office and the Office of Safety.

In 1992, major organizational changes occurred in response to the end of the cold war and the down sizing of the entire military structure. Of most importance to the OC-ALC is the fact that on July 1, 1992, its parent command, AFLC, was merged with the Air Force Systems Command to form the Air Force Materiel Command (AFMC). The new command comprises 52 percent of the Air Force budget. Eighteen percent of all Air Force personnel and 42 percent of the civilian workforce are assigned to the new command.

During 1992, the L-62 Strategic Communications Wing of the U.S. Navy was installed at Tinker AFB. The L-62 Strategic Communications Wing is composed of two squadrons of aircraft that maintain communications with the Navy's submarines.

2.2 SITE DESCRIPTION AND HISTORY

The Soldier Creek Sediment and Surface Water Operable Unit was defined by the ROD as the two unnamed tributaries to Soldier Creek that originate on Tinker AFB. The tributary east of Building 3001 is designated East Soldier Creek and the tributary west of Building 3001 is designated West Soldier Creek. The boundaries for the study were:

- All sediment and surface water of East Soldier Creek that originates on Tinker AFB to the intersection of East Soldier Creek and I-40 north of Tinker AFB

- All sediment and surface water of West Soldier Creek that originates on Tinker AFB to the intersection of West Soldier Creek and I-40 north of Tinker AFB

These initial boundaries included the ditches leading from the thirteen outfalls, eight of which are National Pollutant Discharge Elimination System (NPDES) outfalls, to East and West Soldier Creeks. The boundaries also included the lower portion of Tributary B, as defined in the Remedial Investigation/Feasibility Study (RI/FS) (B&V, 1993c), just upstream of its confluence with East Soldier Creek.

Study area boundaries were identified based on the Remedial Investigation (RI) (B&V, 1993c). Data from the RI indicated that a contaminant concentration gradient exists to a

point just south (upstream) of the study boundary. The study area boundary was established based on the following criteria:

- Limits of measurable levels of contaminants (as compared to background locations)
- Area of such size that a definitive assessment could be performed
- Allowance for source identification

2.2.1 East Soldier Creek

East and West Soldier Creeks drain the northeastern portion of Tinker AFB. Both streams are first-order (headwater) tributaries that have been substantially modified over the years (Figure 2-2). East Soldier Creek now originates where several storm sewers, known as Outfalls H, I, and J, emerge from the north side of 44th Street (north of Building 3705). The emerged portion of East Soldier Creek flows northward about 500 feet and is joined by a tributary from the west which is fed by process effluent and cooling water blow-down (Outfall G). The combined flow continues about 630 feet northward along the east side of Building 3001 to a culvert at Bradley Drive, near which two storm water ditches (Outfalls M and L) enter from the west. This portion of the creek flows in a narrow channel through dense woods. The substrate is mainly bedrock (sandstone), with occasional areas of gravel and sand; virtually no fine-grained depositional sediment is present in this portion of East Soldier Creek.

After crossing under Bradley Drive, East Soldier Creek has a short stretch of flowing water and then becomes an elongated pond, about 600 feet long by 75 feet wide and terminating at a dam. Approximately midway along the pond a tributary fed from process effluent and storm water discharge (Outfall F) enters from the west. Except for the flowing stretch near Bradley Drive, the entire ponded portion of East Soldier Creek is depositional, with relatively thick organically rich silt and fine sand sediments.

Normal flows from the ponded portion of East Soldier Creek are diverted via underground piping through a concrete detention basin (former oil/water separator). Downstream from the

dam the stream has a divided channel, the easternmost is fed by the culvert from the detention basin, and the westernmost of which during normal flow is backwater and during storm events is fed by the dam overflow. Between the dam and Douglas Boulevard, East Soldier Creek bends eastward. This stretch is about 400 feet long, varying from about 20 to 40 feet in width with sand, silt and gravel substrate and moderate flows. About a third of the way between the dam and Douglas Boulevard, the effluent of the Industrial Wastewater Treatment Plant (IWTP) and Sanitary Treatment Plant (STP) currently enters from the west. Near where the stream exits Tinker under Douglas Boulevard, a large storm water conveyance enters from the north.

Beyond Douglas Boulevard, East Soldier Creek flow east-northeastward about 800 feet and is joined by an intermittent tributary (Tributary B) from the south. The stream then flows north-northeast about 1,200 feet to I-40. This off-base stretch is in a deeply incised channel with steep clay banks, surrounded by commercial and residential property near Douglas Boulevard and riparian woodlands beyond Tributary B. Tributary B headwaters are located just upstream of S.E. 36th Street where it flows northward to its confluence with East Soldier Creek north of S.E. 36th Street and east of Douglas Boulevard. East Soldier Creek begins to assume a quasi-natural riffle-and-pool configuration in this stretch, with natural substrates predominated by gravel, sand and silt. There are also substantial amounts of concrete rubble and other anthropogenic debris (e.g., discarded appliances, automobile parts, household trash) in this section of the stream. Beyond I-40, East Soldier Creek flows northward to its confluence with the mainstem of Soldier Creek, which originates off-base near Southeast 59th Street, about 1.5 miles south-southeast of the Building 3001 Complex.

The following buildings were determined during the storm sewer investigation (NUS, 1989) to be partially or totally associated with the East Soldier Creek sewer system.

- Building 2122 - Airframe paint stripping
- Building 3234 - Jet engine test stands
- Building 3703 - Jet engine test stands
- Building 3105 - Hangar and process vacuum heat treat area
- Building 3102 - Hangar and fire station
- Building 3123 - Battery repair
- Building 3108 - Hydraulic test and calibration

- Building 3705 - Engine parts storage
- Building 3001 - Engine repair
- Building 3333 - Administrative
- Building 2210 - Accessories
- Building 3220 - Missiles and avionics
- Building 3221 - Blade repair
- Building 2212 - Boiler house
- Defense Reutilization and Marketing Office Area (DRMO)

Building 3001 consists of an aircraft overhaul and modification facility to support the mission of the Oklahoma City Air Logistics Center. The IWTP receives industrial process wastewater from the Building 3001, as well as process wastewater from other industrial sources throughout the base, via a network of underground piping. Once received by the IWTP, these waters are treated and discharged to East Soldier Creek under NPDES Permit OK1571724391.

Table 2-1 presents the buildings and associated outfalls which contribute discharge to East Soldier Creek.

2.2.2 West Soldier Creek

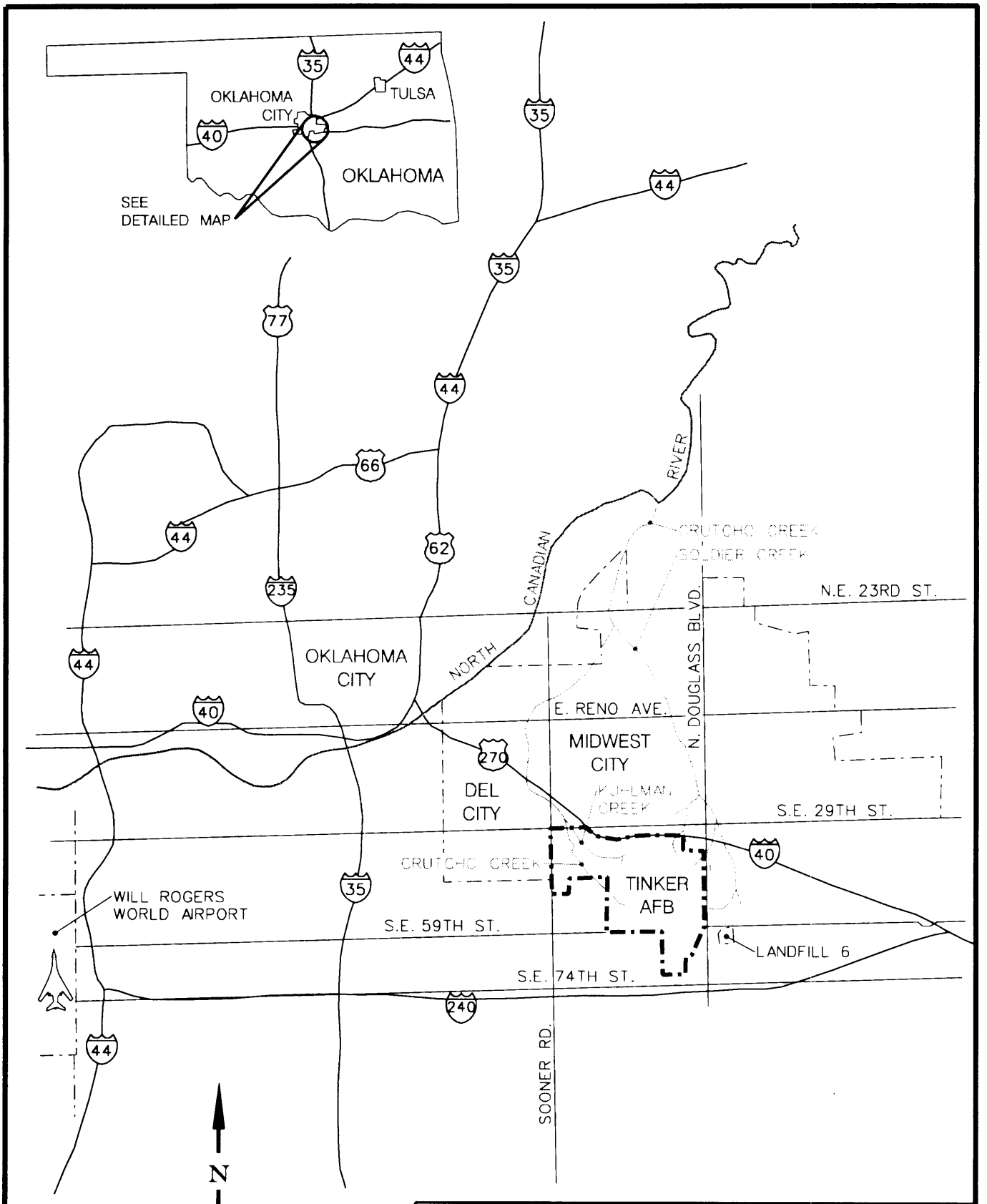
West Soldier Creek starts between the Tinker North/South runway and Building 3001 in a broad grassy swale. It flows northward about 3500 feet and is fed by runoff from the runways and the area west of Building 3001 and from several outfalls (Outfalls A, B, C, D, and E), which normally discharge very little to no water. Table 2-1 presents the buildings and associated outfalls which contribute discharge to West Soldier Creek.

West Soldier Creek originates as a broad swale between the Tinkers North/South runway and the southern end of Building 3001. West Soldier Creek flows northward about 3500 feet and is fed primarily from runoff from the runways and the area west of Building 3001. Outfalls A through E provide minimal discharge to West Soldier Creek. The drainage continues to a point opposite the north end of Building 3001, enters a storm sewer, and emerges off-base from under Industrial Road to flow parallel to and then cross under I-40. The off-base reach of West Soldier Creek is moderately incised, with substrates consisting of bedrock, gravel,

sand, and substantial amounts of concrete rubble. Riparian habitat consists of a narrow band of trees along most of the highway side, and wooded slope on the base side. This reach is approximately 500 feet long and is divided by a spill containment structure midway from its emergence from on-base Tinker and the culverts at I-40. North of I-40, West Soldier Creek flows northeastward through a mixed residential/commercial area and joins the mainstream of Soldier Creek, just west of Douglas Boulevard. From this point, Soldier Creek flows north-northwest approximately 3 miles to join Crutcho Creek, which continues northward about 2 miles and enters the North Fork of the Canadian River.

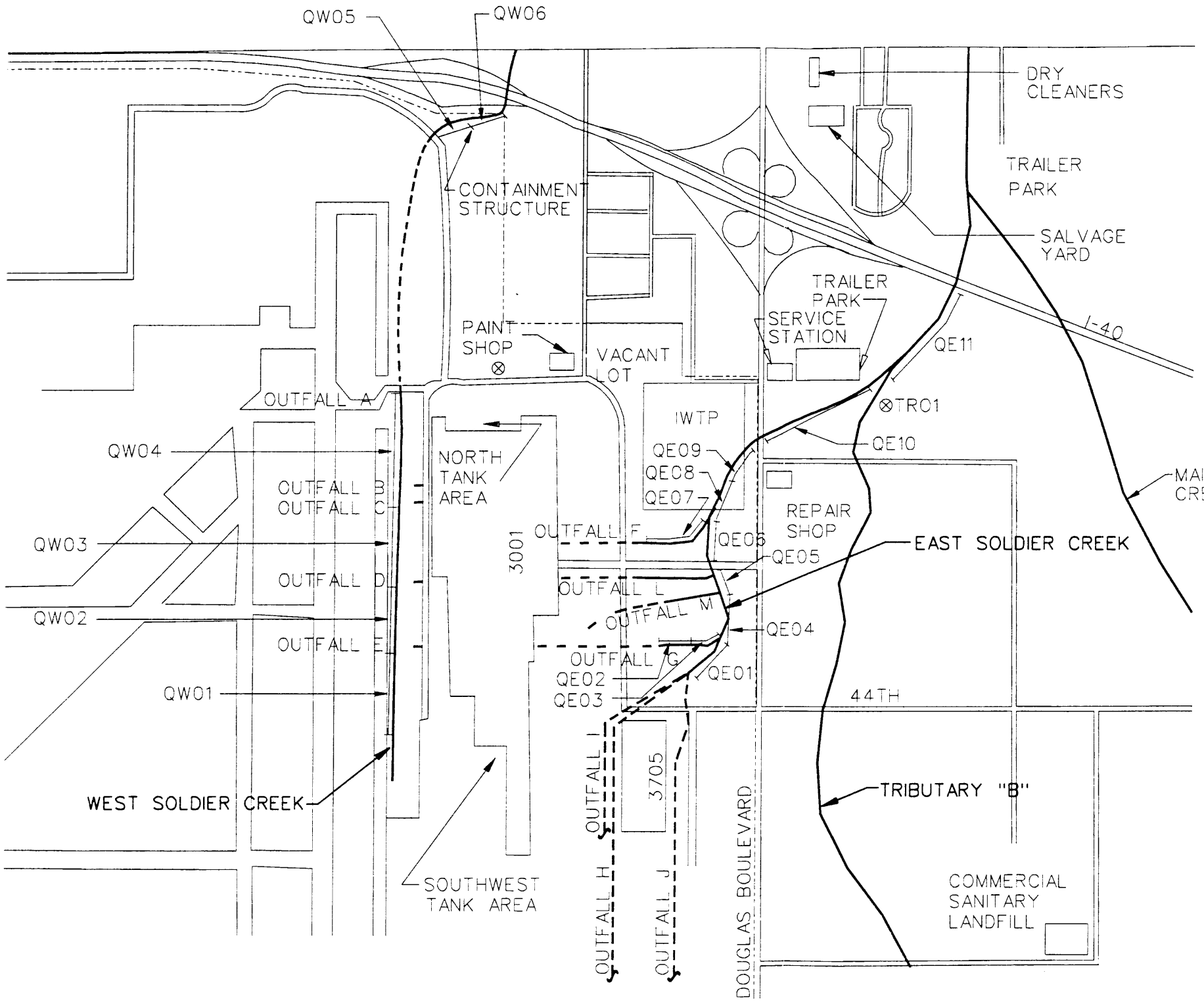
2.2.3 Previous Investigations

Table 2-2 presents a brief summary of previous activities conducted on or near the Soldier Creek OU under the IRP. As part of the overall IRP, Tinker AFB began a preliminary assessment of previous waste disposal sites in 1981. As a result of a basewide sampling program in 1983, which detected trichloroethene (TCE) in the groundwater, extensive investigations were conducted in and around Building 3001. On July 22, 1987, the Building 3001 Site and Soldier Creek Site were added to the NPL. In 1990 and 1991, Black and Veatch Waste Science Technology (B&V) conducted a Phase I and a Phase II RI/FS to determine the extent of sediment and surface water contamination along East, West and Main Soldier Creek. The baseline health risk assessment performed by B&V (1993a) determined that the sediment and surface water of the Soldier Creek OU do not pose a risk to human health in excess of acceptable risk-based exposure levels established by the EPA. The Final Workplans for Long-Term Monitoring and Ecological Assessment of Soldier Creek (Workplans) provided sampling procedures and quality assurance protocol for the quarterly monitoring events (WCFS, 1994).



MCS FILE: SITEMAP

Designed By: D.D.N.	TINKER AIR FORCE BASE		
Drawn By: T.R.F.	OKLAHOMA CITY, OKLAHOMA		
Checked By: D.J.K.	TITLE: Site Vicinity Map		
Submitted By:	PROJECT NUMBER F93506	DATE 2/06/96	FIG. NO. 2-1



LEGEND:

- ——— SOLDIER CREEK AND TRIBUTARIES
- - - - - UNDERGROUND PORTION OF CREEK
- ---------- BOUNDARY OF TINKER AIR FORCE BASE
- ⊗ SAMPLING LOCATION ON TRIBUTARY
- QE01 QUARTERLY MONITORING SEGMENT ON EAST SOLDIER CREEK
- QW01 QUARTERLY MONITORING SEGMENT ON WEST SOLDIER CREEK

N

1000 0 1000 2000

SCALE FEET

Designed By: D.D.N.	TINKER AIR FORCE BASE
Drawn By: T.R.F.	OKLAHOMA CITY, OKLAHOMA
Checked By: L.S.Y.	TITLE: QUARTERLY MONITORING SAMPLING SEGMEN
Submitted By:	PROJECT NUMBER F93506 / DATE 04/16/96 / FIG. N 2-2

MCS FILE: F945068

TABLE 2-1
SOLDIER CREEK
OUTFALLS AND ASSOCIATED BUILDINGS/STRUCTURES

Location	Outfall	Building
West Soldier Creek	A	3001
	B	Drains roadway
	C	3001
	D	3001
	E	3001, 3108
	N	Drains Outfalls A, B, C, D, E
East Soldier Creek	F	3001
	G	3001
	H	2122, 2210, 3001, 3102, 3105, 3220, 3221, 3234, 3703
	I	2122, 2210, 3001, 3102, 3105, 3220, 3221, 3234, 3703
	J	Drains roadway and DRMO area
	L	3001
	M	Drains roadway

Adapted from NUS (1989)

TABLE 2-2
SUMMARY OF PREVIOUS INVESTIGATIONS AND ACTIVITIES

SOLDIER CREEK OPERABLE UNITS

INVESTIGATION/REPORT	ORGANIZATION	DATE
Quarterly Groundwater Sampling	Tulsa COE	December 1987 - March 1989, March and October 1988
Surface Water Sampling	Tinker AFB	March - September 1987
Sediment and Surface Water Sampling	Oklahoma State Department of Health	June 1987
NPDES Surface Water Sampling	Tinker AFB	September 1986 - July 1987
Sediment and Surface Water Sampling	EPA	October 1984, November 1984
Sediment Sampling and Dredging	Harry Keith & Sons, Inc.	October 1985, April and May 1986
Final Storm Sewer Investigation for Soldier Creek	NUS Corporation	October 1989
Industrial Wastewater Treatment Plant Remedial Investigation	Tulsa COE	March 1988 - September 1990
Soldier Creek Remedial Investigation, Phase I and II	B&V Waste Science and Technology Corporation	July 1990, June 1991
Soldier Creek Baseline Risk Assessment	B&V Waste Science and Technology Corporation	February 1993
Soldier Creek Record of Decision	B&V Waste Science and Technology Corporation	August 1993
Workplans for Long-Term Monitoring and Ecological Assessment of Soldier Creek	Woodward-Clyde Federal Services	July 1995
Draft Ecological Assessment	Woodward-Clyde Federal Services	January 1996
Quarterly Monitoring of Sediment and Surface Water	Woodward-Clyde Federal Services	October 1994, January, April, and July 1995
Soldier Creek/Off-Base Groundwater Operable Unit, Remedial Investigation	Parsons Engineering Science	July 1995

source: B&V 1993, and PES 1995

3.0
INVESTIGATION METHODS

3.1 SAMPLING PROCEDURES

During the first year of the long-term monitoring program, quarterly sampling and analysis of sediment and surface water was performed for the segments identified in Figure 2-2. On-base sampling segments included four segments along West Soldier Creek, and nine segments on East Soldier Creek. The off-base portion of the Soldier Creek OU, bounded by I-40, was split into four segments, two on West Soldier Creek and two on East Soldier Creek. One additional sample was collected each quarter from the same location on Tributary B, just above the junction with East Soldier Creek, east of Douglas Boulevard. Stream segments were established based on the locations of known outfalls and structures (i.e., spill containment structures), known or suspected areas of contamination, stream morphology, and by communication with Tinker AFB EM personnel familiar with the project (WCFS, 1994).

Each stream segment was divided into quarters. During each quarterly sampling event, a different quarter of each segment was sampled starting from the most upstream quarter of each segment the first event and ending with the most downstream quarter of each segment on the final quarterly sampling event. Figure 3-1 illustrates the sample locations within each respective sampling section.

The rationale for dividing the stream into segments was to better characterize Soldier Creek surface water and sediment quality temporally and spatially. This sampling methodology was set forth in the ROD (B&V, 1993b).

Sediment and surface water were analyzed quarterly by SW-846 methodologies for volatile organics, semivolatile organics, metals, pesticides and PCB's. Originally, pesticide analysis was to be performed only during the first quarter of sampling. However, due to detection of pesticides in samples collected during the first quarter, pesticide analysis was continued in subsequent sampling events. Table 3-1 presents a list of analytes by method and reporting limits. Actual sediment reporting limits were raised due to percent moisture in the sediment and elevated analyte concentrations.

3.1.1 Sediment Sampling

Sediment samples were collected from a representative location along the stream channel. Sample locations within the quarter of the stream segment being sampled were determined in the field. Basic criteria for determining a representative sample location included flow, depth, deposition, occurrence of discolored sediments, and change in stream morphology.

Depending on the water column depth and sediment characteristics, a trowel, ponar dredge, or hand auger/multi-stage sampler was used to collect sediment samples. Stainless steel trowels were used to collect samples from the 0-6 inch interval. In areas where the water column was too deep to use a trowel, a stainless steel hand auger/multi-stage sampler was used. Sediment samples obtained from 6-12 inches and 3-5 feet were also collected using a stainless steel hand auger/multi-stage sampler.

For discrete sample collection using the trowel, the sampling area was first cleared of vegetation and/or debris. The sample was collected from the upper 6 inches. Upon reaching the surface, the sample was placed in a stainless steel bowl or on a clean sheet of aluminum foil. The sample for volatile and semi-volatile analyses was placed immediately into sample containers. Free water obtained during sample collection was used to eliminate headspace in the volatile and semi-volatile sample containers. The remaining portion of the sediment sample was composited and then transferred to the appropriate containers based upon analysis to be performed. Any remaining free water from the sample collection was returned to the stream. To the extent practical, the sample hole was backfilled with native sediment and vegetation.

The hand auger/multi-stage sampler was lowered to the sediment surface and manually augured to the desired sampling depth or to refusal of the device. Upon reaching the surface, the sample was placed on a clean sheet of aluminum foil. The sample for volatile and semi-volatile analyses was placed immediately into sample containers. Free water obtained during sample collection was used to eliminate headspace in the volatile and semi-volatile sample containers. The remaining portion of the sample was composited and then transferred to the appropriate containers based upon analysis to be performed. Any remaining free water from the sample collection was returned to the stream. To the extent practical, the sample hole was backfilled with native sediment and vegetation.

3.1.2 Surface Water Sampling

Surface water samples were collected prior to sediment sampling, and were obtained from the same location as sediment samples. Care was taken not to disturb the sediments during sampling. When possible, high velocity areas were avoided due to increased volatilization in turbulent waters. Stagnant waters were unavoidable in many segments due to the intermittent nature of the streams. Grab surface water samples were collected by submerging glass or stainless steel sampling devices directly into the creek. The opening of the container faced upstream. The water was then transferred directly into the sample containers and submitted for laboratory analysis.

Field parameters were conducted on surface water samples. These parameters included pH, specific conductance, temperature, and dissolved oxygen. Field measurements were recorded on field sheets. A total of four replicates were measured and averaged for each parameter. Volumetric stream flow in each segment was estimated by determining the cross-sectional area and measuring current velocities across a representative transect using a flow meter.

3.1.3 Decontamination Procedures

All sampling equipment was decontaminated prior to each sampling location and prior to initial use. Decontamination of equipment minimized the risk of cross-contamination to environmental samples from improperly cleaned sampling equipment and ensured that representative samples were obtained. Potable water for all decontamination activities was provided by Tinker AFB.

Equipment used in the cleaning or decontamination of field equipment included:

- Methanol, reagent grade
- Aluminum foil
- Disposable gloves
- Teflon and stainless steel squeeze bottles or sprayers
- Wash tubs of various sizes and scrub brushes
- Potable water
- High Performance Liquid Chromatography (HPLC) water

- Plastic sheeting
- Washwater containment tubs or containers

Equipment decontamination procedures that were employed in the Soldier Creek investigation are as follows:

- Only Teflon and stainless steel containers were used to dispense water, methanol, or other cleaning agents. No plastic containers were used.

- All personnel performing decontamination procedures wore appropriate protective clothing such as disposable gloves, rubber boots, etc., as specified by the Site Safety Officer.

- All decontamination waste fluids were collected in containers with secondary containment and were stored at the drum staging area until disposal.

- All surface water and sediment sampling equipment (e.g. stainless steel bowls, trowels, dredges, and samplers) was decontaminated using brushes and a laboratory-grade detergent/potable water solution, followed by a potable water rinse, a pesticide-grade methanol rinse, and a HPLC water rinse. All equipment was allowed to air dry before sampling. If not immediately used, all decontaminated sampling equipment was wrapped in aluminum foil before storage or reuse.

- All cleaning or wash buckets or tubs were cleaned using laboratory grade detergent/potable water solution and potable water rinse upon mobilization, and upon demobilization.

3.2 SAMPLE IDENTIFICATION

Each sample was identified by a specific field identification number which indicates site name, sampling location, sample type, and sequence number. An example of the sample identification number is as follows:

SC-QE01-SD-101

where SC indicates the site name (Soldier Creek Sediment and Surface Water Operable Unit), QE01 indicates the sampling segment, SD the sample type, and 101 the sequence number.

Following the site name, a four digit alpha-numeric code was used to identify the sampling location. Sampling locations for the investigation were as follows:

- Quarterly monitoring sampling segments on East Soldier Creek were designated by QE01, QE02,....QE11.

- Quarterly monitoring sampling segments on West Soldier Creek were designated by QW01, QW02,...., QW06.

A two-letter designation was used to identify the specific type of sample collected. For the investigation, these sample types were:

- SW - surface water sample
- SD - sediment sample

The last three-digit code is the sequence identifier. This number was used to separate samples collected at the same sampling location but at different depth intervals (for soil samples) or time intervals or for duplicate samples. The first digit of the sequence number indicates the quarter of the stream segment being sampled for quarterly monitoring The sequence the samples were taken is indicated by the second and third digits. The second and third digits always began with 01 at each location. In the above example, 101 indicates the first sample taken in the first quarter of segment QE01 (i.e., 0-6 inches). A sequence identifier of 102 indicates the second sample taken in the first quarter of segment QE01 (i.e., 6-12 inches). A sequence identifier of 201 indicates the first sample taken in the second quarter of segment QE01. Duplicate samples for each sampling event were identified by adding 500 to the sequence identifier of the corresponding sample (i.e., SC-QE01-SD-101 duplicate would be identified as SC-QE01-SD-501).

3.3 ANALYTICAL PARAMETERS

Sediment and surface water samples were analyzed for volatile organics, semi-volatile organics, metals, PCB's and pesticides. A summary of the constituents for analysis, containers, preservation, and holding times are presented in Table 3-2. All samples collected for analysis were analyzed by Quanterra Environmental Services of Arvada, Colorado.

3.4 QUALITY CONTROL/QUALITY ASSURANCE

Quality Assurance (QA) procedures were performed in general accordance with the Quality Assurance Project Plan (QAPP) of the Workplans (WCFS, 1994). No deviations from the QAPP occurred in the field during the quarterly sampling.

Field duplicates, matrix spikes, and matrix spike duplicates were collected at a rate of approximately 10 percent (i.e., 1 for every 10 samples). One rinsate was collected for each day of sampling. These Quality Assurance/Quality Control (QA/QC) samples were collected to assess field sampling procedures (including decontamination) and field collection precision. Laboratory controlled trip blank samples accompanied each cooler with samples for VOC analysis to assess potential cross-contamination. One field ambient blank for each quarterly sampling event was collected by pouring HPLC water, used for decontamination of equipment and rinsate samples, directly into sample bottles. The ambient blank sample was collected to assess the effects of background conditions, potential sample container contamination, and the quality of the HPLC water.

A Quality Assurance/Quality Control (QA/QC) review was performed by QES. A QA/QC data assessment was performed by WCFS which included full validation of twenty percent of the data, for each quarterly monitoring event, using the SW-846 methods (USEPA, 1992) and the EPA Contract Laboratory Program (CLP) National Functional Guidelines for Organic and Inorganic Data Review (Guidelines) (USEPA, 1994a, 1994b). Data assessment is herein defined as the systematic, structured process of evaluating, editing, screening, checking, verifying, and reviewing to assure that analytical data are in compliance with established criteria and are valid for the intended use.

The full validation consisted of a review of SW-846 results summary sheets and instrument reports for QA/QC parameters such as matrix spikes (MS), matrix spike duplicates (MSDs), detection limits, calibrations, duplicate control samples (DCS), single control samples (SCS), chain of custody forms, sample preparations, holding times, etc. In addition the review, consisted of recalculating laboratory data and standard calibration curves, checking for transcription errors, and carefully checking chromatograms and reconstructed ion chromatograms. The purpose of the full validation is to evaluate whether laboratory performance and analytical data are in compliance with method requirements and project specifications for accuracy, precision, validity, and completeness.

The data assessment process provides information on analytical limitations of data based on regulatory or method specific QA/QC criteria. In addition, the review process assigns data qualifiers and provides a statement concerning useability of data. To ensure the data gathered during the investigation activities are adequate; precision, accuracy, representativeness, completeness, and comparability (PARCC) parameter targets have been identified for Level III analyses during the development of Data Quality Objectives (DQOs) and planning of the field activities. Level III analyses included all laboratory analyses using EPA methods. Quality of the analytical data is indicated by the calculation of values for precision, accuracy, and completeness. The quantitative target values for precision, accuracy, and completeness are as follows:

- Precision = 20 percent
- Accuracy = control limits specified for the particular analysis
- Completeness = 90 percent

Comparability and representativeness are assessed in a qualitative evaluation of the data generated during the field investigation.

The data generated during the first year of quarterly monitoring at Soldier Creek, Tinker Air Force Base were reviewed as described above. The data were evaluated to be usable as received from QES for their stated and intended purpose. Complete results of data validation and signed Chain of Custody Forms are presented in the quarterly reports (WCFS, 1995 a,b,c,d).

Designed By:	TINKER AIR FORCE BASE		
D.D.N.	OKLAHOMA CITY, OKLAHOMA		
Drawn By: T.R.F.	TITLE: QUARTERLY MONITORING SAMPLING SEGMENTS		
Checked By:			
Submitted By:	PROJECT NUMBER F93506	DATE 02/06/96	FIG. NO 3-1

MCS FILE: SOLID-01HP-GTABH

SCALE FEET

1600 800 0 800 1600

N

LEGEND:

SOLDIER CREEK AND TRIBUTARIES

UNDERGROUND PORTION OF CREEK

BOUNDARY OF TINKER AIR FORCE BASE

SAMPLING LOCATION ON TRIBUTARY 3

1ST QUARTER SAMPLE LOCATION

2ND QUARTER SAMPLE LOCATION

3RD QUARTER SAMPLE LOCATION

4TH QUARTER SAMPLE LOCATION

COMMERCIAL SANITARY LANDFILL

TRIBUTARY "3"

DOUGLASS BOULEVARD

44TH ST.

OUTFALL J

OUTFALL H

OUTFALL I

3705

OUTFALL G

OUTFALL K

OUTFALL L

OUTFALL F

OUTFALL E

OUTFALL D

OUTFALL C

OUTFALL B

OUTFALL A

OUTFALL N

WEST SOLDIER CREEK

SOUTHWEST TANK AREA

NORTH TANK AREA

EAST SOLDER CREEK

CONTAINMENT STRUCTURE

MAIN SOLDIER CREEK

SERVICE STATION

TRAILER PARK

VACANT LOT

PAINT SHOP

SALVAGE YARD

DRY CLEANERS

TRAILER PARK

OW01

OW02

OW03

OW04

OW05

OW06

3001

DE01

DE02

DE03

DE04

DE05

DE06

DE07

DE08

DE09

DE10

DE11

TR01

TABLE 3-1
ANALYTES AND REPORTING LIMITS

Analytes	Sediment[1] (ug/kg)[2]	Water (ug/L)[2]
Recoverable Metals - Method 6010		
Aluminum	10	0.1
Antimony	6	0.06
Arsenic	10	0.1
Barium	1	0.01
Beryllium	0.2	0.002
Boron	10	0.1
Cadmium	0.5	0.005
Calcium	20	0.2
Chromium	1	0.01
Cobalt	1	0.01
Copper	2	0.02
Iron	10	0.1
Lead	5	0.05
Magnesium	20	0.2
Manganese	1	0.01
Molybdenum	2	0.02
Nickel	4	0.04
Potassium	500	0.3
Silver	1	0.01
Sodium	500	5
Thallium	200	2
Tin	10	0.1
Vanadium	1	0.01
Zinc	2	0.02
Metals - Methods As(7060), Pb(7421), Hg(7470/7471), Se(7740), Tl(7841)		
Arsenic	0.5	0.005
Lead	0.5	0.005
Mercury	0.1	0.0002
Selenium	0.5	0.005
Thallium	0.5	0.005
PCB's and Chlorinated Pesticides - Method 8080		
4,4'-DDD	3.3	0.01
4,4'-DDE	3.3	0.01
4,4'-DDT	3.3	0.01
Aldrin	1.7	0.005
alpha-BHC	1.7	0.005
alpha-Chlordane	1.7	0.005
Aroclor 1016	33	0.1
Aroclor 1221	33	0.1

TABLE 3-1
ANALYTES AND REPORTING LIMITS

Analytes	Sediment[1] (ug/kg)[2]	Water (ug/L)[2]
Aroclor 1232	33	0.1
Aroclor 1242	33	0.1
Aroclor 1248	33	0.1
Aroclor 1254	33	0.1
Aroclor 1260	33	0.1
beta-BHC	1.7	0.005
delta-BHC	1.7	0.005
Dieldrin	3.3	0.01
Endosulfan I	1.7	0.005
Endosulfan II	3.3	0.01
Endosulfan sulfate	3.3	0.01
Endrin	3.3	0.01
gamma-BHC (Lindane)	1.7	0.005
gamma-Chlordane	1.7	0.005
Heptachlor	1.7	0.005
Heptachlor epoxide	1.7	0.005
Methoxychlor	17	0.05
Toxaphene	170	0.25
Volatile Organics - Method 8240		
Acetone	10	10
Acrolein	100	100
Acrylonitrile	100	100
Benzene	5	5
Bromodichloromethane	5	5
Bromoform	5	5
Bromomethane	10	10
2-Butanone (MEK)	10	10
Carbon disulfide	5	5
Carbon tetrachloride	5	5
Chlorobenzene	5	5
Chloroethane	10	10
Chloroform	5	5
Chloromethane	10	10
Dibromochloromethane	5	5
Dibromomethane	5	5
trans-1,4-Dichloro-2-butene	5	5
Dichlorodifluoromethane	20	20
1,1-Dichloroethane	5	5
1,2-Dichloroethane	5	5
1,1-Dichloroethene	5	5
1,2-Dichloropropane	5	5
cis-1,3-Dichloropropene	5	5
trans-1,3-Dichloropropene	5	5

TABLE 3-1
ANALYTES AND REPORTING LIMITS

Analytes	Sediment[1] (ug/kg)[2]	Water (ug/L)[2]
Ethylbenzene	5	5
Ethyl methacrylate	20	20
Iodomethane	5	5
2-Hexanone	10	10
Methylene chloride	5	5
4-Methyl-2-pentanone (MIBK)	10	10
Styrene	5	5
1,1,1,2-Tetrachloroethane	5	5
1,1,2,2-Tetrachloroethane	5	5
Tetrachloroethene	5	5
Toluene	5	5
1,1,1-Trichloroethane	5	5
1,1,2-Trichloroethane	5	5
Trichlorethene	5	5
Trichlorofluoromethane	5	5
1,2,3-Trichloropropane	5	5
Vinyl acetate	10	10
Vinyl chloride	10	10
Xylenes (total)	5	5
trans-1,2-Dichloroethene	5	5
Ethanol	--	--
2-Chlorethyl vinyl ether	--	--
Semivolatile Organics - Method 8270		
Acenaphthene	330	10
Acenaphthylene	330	10
Acetophenone	330	10
4-Aminobiphenyl	330	10
Aniline	330	10
Anthracene	330	10
Benzo(a)anthracene	330	10
Benzo(b)fluoranthene	330	10
Benzo(k)fluoranthene	330	10
Benzo(g,h,i)perylene	330	10
Benzo(a)pyrene	330	10
Benzyl alcohol	330	10
4-Bromophenyl phenyl ether	330	10
Butyl benzyl phthalate	330	10
4-Chloroaniline	330	10
bis(2-Chloroethoxy)methane	330	10
bis(2-Chloroethyl)ether	330	10
bis(2-Chloroisopropyl)ether	330	10
4-Chloro-3-methylphenol	330	10
2-Chloronaphthalene	330	10

TABLE 3-1
ANALYTES AND REPORTING LIMITS

Analytes	Sediment[1] (ug/kg)[2]	Water (ug/L)[2]
2-Chlorophenol	330	10
4-Chlorophenyl phenyl ether	330	10
Chrysene	330	10
Dibenz(a,h,)anthracene	330	10
Dibenzofuran	330	10
Di-n-butyl phthalate	330	10
1,2-Dichlorobenzene	330	10
1,3-Dichlorobenzene	330	10
1,4-Dichlorobenzene	330	10
3,3'-Dichlorobenzidine	660	20
2,4-Dichlorophenol	330	10
2,6-Dichlorophenol	330	10
Diethyl phthalate	330	10
p-Dimethylaminoazobenzene	330	10
7,12-Dimethylbenz(a)-anthracene	330	10
a,a-Dimethylphenethyl-amine	330	10
2,4-Dimethylphenol	330	10
Dimethyl phthalate	330	10
4,6-Dinitro-2-methylphenol	1600	50
2,4-Dinitrophenol	1600	50
2,4-Dinitrotoluene	330	10
2,6-Dinitrotoluene	330	10
Di-n-octyl phthalate	330	10
Diphenylamine	330	10
bis(2-Ethylhexyl)phthalate	330	10
Ethyl methanesulfonate	330	10
Fluoranthene	330	10
Fluorene	330	10
Hexachlorobenzene	330	10
Hexachlorobutadiene	330	10
Hexachlorocyclopentadiene	330	10
Hexachloroethane	330	10
Indeno(1,2,3-cd)pyrene	330	10
Isophorone	330	10
3-Methylcholanthrene	330	10
Methyl methanesulfonate	330	10
2-Methylnaphthalene	330	10
2-Methylphenol	330	10
3/4-Methylphenol	330	10
Naphthalene	330	10
1-Naphthylamine	330	10
2-Naphthylamine	330	10
3-Nitroaniline	1600	50
4-Nitroaniline	1600	50

TABLE 3-1
ANALYTES AND REPORTING LIMITS

Analytes	Sediment[1] (ug/kg)[2]	Water (ug/L)[2]
Nitrobenzene	330	10
2-Nitrophenol	330	10
4-Nitrophenol	1600	10
N-Nitroso-di-n-butylamine	330	10
N-Nitrosodiphenylamine	330	10
N-Nitroso-di-n-propylamine	330	10
N-Nitrosopiperidine	330	10
Pentachlorobenzene	330	10
Pentachloronitrobenzene	1600	10
Pentachlorophenol	1600	10
Phenacetin	330	10
Phenanthrene	330	10
Phenol	330	10
-Picoline	330	10
Pronamide	330	10
Pyrene	330	10
1,2,4,5-Tetrachloro-benzene	330	10
2,3,4,6-Tetrachlorophenol	1600	50
1,2,4-Trichlorobenzene	330	10
2,4,5-Trichlorophenol	1600	50
2,4,6-Trichlorophenol	330	10
Benzidine	2500	50
1-Chloronaphthalene	2500	50
Dibenz(a,j)acridine	--	--
Azobenzene	2500	50
Benzoic acid	2500	50

[1] Actual sediment reporting limits vary due to percent moisture, and preparation dilution

[2] Metals results reported in mg/kg for sediment and mg/L for water

TABLE 3-2
QUARTERLY MONITORING
ANALYTES, CONTAINERS, PRESERVATION AND HOLDING TIMES

MEDIA	METHOD	PARAMETER	CONTAINER	PRESERVATION	HOLDING TIME
Sediment	SW-486 8240	Volatile Organics	4 oz. wide-mouthed jars	4° C	14 days
Sediment	SW-846 6010/7000	Metals	*16 oz. wide-mouthed jars	4° C	180 days Hg - 28 days
Sediment	SW-846 8270	Semivolatile Organics	*16 oz. wide-mouthed jars	4° C	14 days to extraction 40 days to analysis
Sediment	SW-846 8080	Pesticides (with PCB's)	*16 oz. wide-mouthed jars	4° C	14 days to extraction 40 days to analysis
Water	SW-846 8240	Volatile Organics	Three 40-ml. glass vial w/Teflon cap	4° C HCl pH<2	14 days
Water	SW-846 6010/7000	Metals (incl. Hg)	One 500-ml plastic bottle	HNO^3 pH<2	180 days Hg - 28 days
Water	SW-846 8270	Semivolatile Organics	Two 32oz glass (amber)	4° C	7 days to extraction 40 days to analysis
Water	SW-846 8080	Pesticides (with PCB's)	Two 32oz glass (amber)	4° C	7 days to extraction 40 days to analysis

*One 16oz glass container filled is sufficient for all of the metals and organic analysis
**If oxidizing agents present, add .6 grams ascorbic acid per liter

4.0
HUMAN HEALTH RISK ASSESSMENT

An evaluation of risks associated with Soldier Creek surface water and sediments was previously performed by Black & Veatch Waste Science Technology (B&V, 1993). Since the time of the original risk assessment, additional information on the nature and extent of stream contamination has been collected, including additional sediment and surface water sampling, as well as information on pesticides and PCBs not previously evaluated. The purpose of the present HHRA is to provide information on potential current and future risks based on current surface water and sediment contaminant levels, to compare the results with those of B&V to see if the previous conclusions are still valid, and to develop cleanup goals that are protective of human populations. The HHRA is presented in its entirety in Appendix A.

This HHRA is performed using guidance provided in the Risk Assessment Guidance for Superfund - Part A and Part B, Exposure Factors Handbook, Standard Default Exposure Factors, Dermal Exposure Assessment: Principles and Applications, and EPA Supplemental Region IV Risk Assessment Guidance. Environmental data obtained from surface water and sediment samples collected by Woodward-Clyde in the first four quarterly sampling events (WCFS, 1994), supplemented with chemical data from sediment samples collected by Parson Engineering Science (PES, 1995) were used in this HHRA. In addition, the HHRA made use of recent EPA databases, including the Integrated Risk Information System (IRIS;, Health Effects Assessment Summary Tables (HEAST); EPA Region III Risk-Based Concentration Table and Drinking Water Regulation and Health Advisories. References used in the HHRA are cited in Appendix A.

Based on differences in contaminant sources and exposed populations, the following four stream segments were evaluated in this risk assessment:

- West Soldier Creek, on-base
- West Soldier Creek, off-base
- East Soldier Creek, on-base
- East Soldier Creek, off-base

The chemicals of potential concern identified include metals, PCBs, chlorinated pesticides, volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs). An evaluation of potential health risks was performed for a group of exposure scenarios believed to represent potential forms of human activities that could occur at these areas. These exposure scenarios include the following:

- Construction workers involved in repair or installation of underground pipelines around or under on-base portions of the creeks
- Residents wading or swimming in the off-base portion of West and East Soldier Creeks. (Swimming was only evaluated for the child scenario for East Soldier Creek; all other scenarios assume wading only)

Potential health risks associated with surface water and sediment exposure were evaluated for both on-site construction workers and off-site residents. The results of the risk characterization indicate that potential cancer risks and non-carcinogenic health hazards for all scenarios are less than the advisory range of 10^{-6} to 10^{-4} and 1.0, respectively. These results indicate that exposure to surface water and sediments in West and East Soldier Creeks is not likely to result in an unacceptable cancer risk or non-carcinogenic hazard for any on-base or off-base populations under current or future stream use conditions.

The results of this current risk assessment were compared to those presented in the previous baseline risk assessment prepared by B&V (1993). The following differences in approaches/assumptions were noted between these two documents:

- The current HHRA evaluated PCBs/chlorinated pesticides as potential COCs. The BHRA prepared by B&V did not include these data
- The individual stream segments, evaluated in the B&V BHRA are not identical to the segments evaluated in the current HHRA (the stream segments evaluated in the current HHRA are thought to be more representative of actual stream use)
- Some of the exposure assumptions used in current HHRA are different than those used in B&V BHRA (e.g., the current HHRA uses age-corrected surface area for evaluating exposure to surface water and sediments; B&V BHRA values were not age corrected, which was not required at the time of the BHRA).

Despite these slight difference in approach, both the BHRA and HHRA concluded that there are no unacceptable cancer risks or non-carcinogenic hazards associated with exposure to West or East Soldier Creeks for any on-base or off-base populations, under current or future stream use conditions. Thus no remedial action appears to be warranted based on risks to human health.

As part of the risk assessment, a set of cleanup goals was developed to identify health-protective levels for each COC. Although remediation does not appear to be warranted at the present time (based on risk to human health), these cleanup goals provide a set of "action criteria", should remedial action be required in the future.

5.0
DISCUSSION OF QUARTERLY MONITORING RESULTS

This section discusses data screening and evaluation procedures and the results of the first four quarters of sediment and surface water sampling of the Soldier Creek Operable Unit.

5.1 DATA SCREENING

The purpose of data screening and analysis was to determine which analytes are present and which of those exceed medium specific decision criteria. For this assessment, a simple two step procedure was used. The basis of the first step was to establish the presence or absence of analytes in the sediment and surface water samples. First, all analytes reported in detectable concentrations were tabulated on a site by site basis for each quarter.

The second step involved sample by sample comparisons to screening criteria. Screening criteria were set forth in the ROD (B&V, 1993b) and the WCFS HHRA (Appendix A). These screening criteria are risk-based values to which specific analyte concentrations are compared. If sample concentrations were below the decision criteria, it was assumed that the analyte does not pose an unacceptable risk to human health and response actions are not required. Therefore, the analyte was dropped from further consideration. If screening criteria were exceeded, the analyte was considered a potential contaminant of concern and was retained for additional analysis.

According to the ROD (B&V, 1993b), unacceptable exposures were determined based on the following criteria:

- Contaminant concentrations in sediment or surface water exceeding health levels based on an excess lifetime cancer risk of 10^{-4}. Contaminant concentrations detected in the 10^{-4} to 10^{-6} range may potentially indicate an unacceptable exposure level and will be evaluated to determine if the exposure level was unacceptable and remediation, therefore, necessary.

- Contaminant concentrations in sediment or surface water with non-carcinogenic hazard indices (HIs) greater than 1.0

- Contaminant concentrations in sediment or surface water that present an unacceptable ecological risk

The first two criteria were based on exposure factors developed by the BHRA for human health under the RI/FS, and the HHRA based on current monitoring results. Summaries of carcinogenic and non-carcinogenic risks for contaminants of concern in sediment and surface water from the BHRA are presented in Table 5-1 and Table 5-2. Risk based cleanup levels developed by the HHRA for sediment and surface water are presented in Tables 5-3 and 5-4. Ecological criteria are being addressed under a separate evaluation (WCFS, 1996).

5.2 EVALUATION AND DISCUSSION OF RESULTS

5.2.1 Sediment

A total of 137 sediment samples were collected during the first year of quarterly monitoring. Total sediment samples collected from the 17 segments and Tributary B for the first through fourth quarters were 37, 30, 36, and 34, respectively. Sediment samples were collected at three intervals from 0-6 inches, 6-12 inches and 3-5 feet. When refusal of the sampling device occurred prior to 5 feet bgs, a sample was typically collected from the bottom one foot interval of the boring. The number of sediment samples collected varied quarterly based on the depth of sediment at each sampling location. In some sampling segments, particularly on-base East Soldier Creek, upstream of Bradley Drive, the stream bed is scoured to bedrock with few, shallow depositional areas.

Appendix B contains tables which summarize the analyte concentrations in each quarter. Table 5-5 presents the frequency of detection, maximum, minimum and average concentrations of analytes detected in sediment. Statistical summaries were calculated based on detected concentrations in analytical samples, excluding detections in QA/QC samples and non-detects. The sample location at which the maximum concentration of an analyte was detected is presented in Table 5-6. Table 5-7 presents a summary of analytes which exceeded the B&V screening criteria from the BHRA described in Section 5-1. Analytes which

exceeded HHRA 10^{-5} and 10^{-6} carcinogenic screening criteria are presented in Tables 5-8 and 5-9, respectively. No analytes in sediment samples exceeded the WCFS HHRA non-carcinogenic or 10^{-4} carcinogenic screening criteria.

5.2.1.1 Metals

Twenty-three metals were detected during the four quarters of monitoring. Recoverable metals detected by Method 6010 were: aluminum, antimony, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, magnesium, manganese, nickel, potassium, silver, sodium, vanadium, and zinc. Metals detected by Methods 7060, 7421, 7470/7471, 7740, and 7841 were arsenic, lead, mercury, selenium, and thallium, respectively.

The most frequently detected metals and their maximum concentrations were aluminum (23,400 mg/kg), barium (4,700 mg/kg), calcium (210,000 mg/kg), chromium (3,210 mg/kg) copper (2,210 mg/kg), iron (28,500 mg/kg), magnesium (30,600 mg/kg), manganese (4,250 mg/kg), vanadium (95.7 mg/kg), and zinc (1,790 mg/kg). These metals were detected in all 137 sediment samples collected during the first year of quarterly monitoring.

The highest metal concentration was calcium (210,000 mg/kg) from sample QE04-401, collected downstream of Outfall G on East Soldier Creek, which is believed to be naturally occuring The sample was collected during the fourth quarter sampling event from 0-6 inches. Calcium was detected in 137 analytical samples. The average and lowest concentrations of calcium for the first year of quarterly sampling were 38,817 mg/kg, and 471 mg/kg, respectively.

Metals concentrations did not exceed BHRA or HHRA screening criteria in any sediment samples.

5.2.1.2 PCB's and Chlorinated Pesticides

Aldrin, alpha-BHC, alpha-chlordane, aroclor 1254, delta-BHC, endosulfan sulfate, endrin, heptachlor, heptachlor epoxide, and methoxychlor were detected in the sediments during the first year of quarterly monitoring. When pesticides or PCBs were detected in an analytical sample, a second column was run. The maximum result of the two columns were reported

for the pesticides and PCBs concentration in an analytical sample. The most frequently detected compound was Aroclor 1254 which was detected in 80 sediment samples. The highest concentration of Aroclor 1254 was 40,000 ug/kg in sample QE02-301, collected from the upper-half of Outfall G on East Soldier Creek. The sample was collected the third quarter, in April 1995, from 0-6 inches. The average and minimum reported concentrations of Aroclor 1254 for the first year of quarterly sampling were 3,329 ug/kg and 33 ug/kg, respectively.

The highest reported concentration was heptachlor (52,000 ug/kg) from sample QE07-402, collected from Outfall F on East Soldier Creek. The sample was collected the fourth quarter, in July 1995, from 6-12 inches. The average and minimum reported concentrations of heptachlor for the first year of quarterly sampling were 2,873 ug/kg and 1.7 ug/kg, respectively.

Pesticides and PCBs were not identified as potential contaminants of concern in the BHRA (B&V, 1993a). Consequently, screening criteria were not available from the BHRA for evaluation.

Two pesticides, heptachlor and aldrin were identified as potential contaminants of concern by exceeding HHRA screening criteria.

Heptachlor was detected in 23 analytical samples. Heptachlor detected in sample QE07-402 (52,000 ug/kg) exceeded the 10^{-5} HHRA cleanup goal (17,156 ug/kg). The sample was collected during the fourth quarter sampling event from Outfall F on East Soldier Creek from 6-12 inches. Heptachlor detected in sample QE09-402 (3,100 ug/kg) exceeded the 10^{-6} HHRA cleanup goal (1,715 ug/kg). Sample QE09-402 was collected during the fourth quarter sampling event near the IWTP Outfall on East Soldier Creek from 6-12 inches. The average and lowest concentrations of heptachlor during the first year of quarterly monitoring were 2,873 ug/kg, and 1.7 ug/kg, respectively.

Aldrin was detected in 22 analytical samples, two of which exceeded HHRA 10^{-6} screening criteria of 454 ug/kg. The analytical samples which exceeded screening criteria were QE07-301 (840 ug/kg) and QE07-302 (650 ug/kg), collected during the fourth quarter sampling event from Outfall F on East Soldier Creek at sample intervals 0-6 inches and 6-12 inches,

respectively. The average and lowest concentrations of aldrin during the first year of quarterly monitoring were 840 ug/kg, and 73 ug/kg, respectively.

5.2.1.3 Semivolatile Organics

Thirty-eight semivolatile organic compounds were detected during the first four quarters of monitoring. The compounds detected during the first year of monitoring were: 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1-chloronaphthalene, 2,4-dimethylphenol, 2-chloronaphthalene, 2-methylnaphthalene, 3/4-methyphenol, acenaphthene, acenaphthylene, acetophenone, anthracene, benzidine, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, benzoic acid, bis(2-ethylhexyl)phthalate, butyl benzyl phthalate, chrysene, di-n-butyl phthalate, di-n-octyl phthalate, dibenz(a,h)anthracene, dibenz(a,j)acridine, dibenzofuran, dimethyl phthalate, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, isophorone, n-nitrosodiphenylamine, naphthalene, pentachlorophenol, phenanthrene, phenol, and pyrene.

The most frequently detected semivolatile analyte was fluoranthene. Fluoranthene was detected in 113 analytical samples. The maximum concentration of fluoranthene was 53,000 ug/kg detected in segment QE04 analyzed during the fourth quarter. The average and minimum concentrations for fluoranthene over the first year of sampling were 4,082 ug/kg and 44 ug/kg, respectively.

Eight semivolatile analytes were identified as potential contaminants of concern by exceeding the risk-based screening criteria. The following polyaromatic hydrocarbons (PAHs): benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, and chrysene, exceeded the BHRA screening criteria during every sampling event (Table 5-7). Indeno(1,2,3-cd)pyrene exceeded the BHRA screening criteria in one sediment sample during sampling event. Benzidine and dibenz(a,h)anthracene exceeded the HHRA 10^{-6} screening criteria in one and seven analytical samples, respectively.

Benzidine was detected in 2 analytical samples, one of which exceeded the HHRA 10^{-6} screening criteria of 420 ug/kg. The highest concentration of benzidine was 430 ug/kg detected in sample QW03-202, collected from the lower portion of Outfall G on East Soldier Creek. The sample was collected during the second quarter sampling event from 6-12 inches.

The average and lowest detected concentrations of benzidine during the first year of quarterly monitoring were 295 ug/kg, and 160 ug/kg, respectively.

Benzo(a)anthracene was detected in 95 analytical samples, 29 of which exceeded BHRA 10^{-6} screening criteria of 1,600 ug/kg and 5 of which exceeded HHRA 10^{-6} screening criteria of 10,575 ug/kg. The highest concentration of benzo(a)anthracene was 39,000 ug/kg detected in sample QE04-401, collected downstream of Outfall G on East Soldier Creek. The sample was collected during the fourth quarter sampling event from 0-6 inches. The average and lowest detected concentrations of benzo(a)anthracene during the first year of quarterly monitoring were 2,254 ug/kg, and 41 ug/kg, respectively.

Benzo(b)fluoranthene was detected in 97 analytical samples, 39 of which exceeded BHRA 10^{-6} screening criteria of 1,600 ug/kg and 5 of which exceeded HHRA 10^{-6} screening criteria of 10,575 ug/kg. The highest concentration of benzo(b)fluoranthene was 28,000 ug/kg detected in sample QE06-102, collected downstream of Bradley Drive on East Soldier Creek. The sample was collected during the first quarter from a depth of 6-12 inches. The average and lowest detected concentrations of benzo(b)fluoranthene during the first year of quarterly monitoring were 2,725 ug/kg, and 40 ug/kg, respectively.

Benzo(k)fluoranthene was detected in 22 analytical samples, 12 of which exceeded BHRA 10^{-6} screening criteria of 1,600 ug/kg. The highest concentration of benzo(k)fluoranthene was 39,000 ug/kg detected in sample QE04-401, collected downstream of Outfall G on East Soldier Creek. The sample was collected the during the fourth quarter sampling event from 0-6 inches. The average and lowest detected concentrations of benzo(k)fluoranthene during the first year of quarterly monitoring were 4,398 ug/kg, and 46 ug/kg, respectively.

Benzo(a)pyrene was detected in 93 analytical samples, 28 of which exceeded BHRA 10^{-6} screening criteria of 1,600 ug/kg, 3 of which exceeded HHRA 10^{-5} screening criteria of 10,575 ug/kg, and 40 of which exceeded HHRA 10^{-6} screening criteria of 1,057 ug/kg. The highest concentration of benzo(a)pyrene was 26,000 ug/kg detected in sample QE04-401, collected downstream of Outfall G on East Soldier Creek. The sample was collected during the fourth quarter sampling event from 0-6 inches. The average and lowest detected concentrations of benzo(a)pyrene during the first year of quarterly monitoring were 2,037 ug/kg, and 46 ug/kg, respectively.

Chrysene was detected in 103 analytical samples, 33 of which exceeded BHRA 10^{-6} screening criteria of 1,600 ug/kg. The highest concentration of chrysene was 35,000 ug/kg detected in sample QE04-401, collected downstream of Outfall G on East Soldier Creek. The sample was collected during the fourth quarter sampling event from 0-6 inches. The average and lowest detected concentrations of chrysene during the first year of quarterly monitoring were 2,471 ug/kg, and 40 ug/kg, respectively.

Dibenz(a,h)anthracene was detected in 31 analytical samples, seven of which exceeded the HHRA 10^{-6} screening criteria of 1,057 ug/kg. The highest concentration of dibenz(a,h)anthracene was 10,000 ug/kg detected in sample QE04-401, collected downstream of Outfall G on East Soldier Creek. The sample was collected during the fourth quarter sampling event from 0-6 inches. The average and lowest detected concentrations of dibenz(a,h)anthracene during the first year of quarterly monitoring were 744 ug/kg and 89 ug/kg, respectively.

Indeno(1,2,3-cd)pyrene was detected in 79 analytical samples, one of which exceeded the BHRA screening criteria of 12,000 ug/kg and the HHRA 10^{-6} screening criteria of 10,575 ug/kg. The highest concentration of indeno(1,2,3-cd)pyrene was 19,000 ug/kg detected in sample QE04-401; collected downstream of Outfall G on East Soldier Creek. The sample was collected during the fourth quarter sampling event from 0-6 inches. The average and lowest detected concentrations of indeno(1,2,3-cd)pyrene during the first year of quarterly monitoring were 1,228 ug/kg, and 44 ug/kg, respectively.

During each event, a different quarter of each segment was sampled as described in Section 3-1. Therefore, care must be taken when drawing inferences concerning changes in concentration with time. However, several trends may be seen in Table 5-10 which compares the maximum detected analyte concentrations from each quarter to the Phase I and II RI sediment results. Benzo(a)anthracene, Benzo(b)fluoranthene, and Chrysene exhibit a slight decrease in concentration from the first to second quarter monitoring events. While Benzo(k)fluoranthene and Benzo(a)pyrene exhibit little apparent change in concentration. However, from the second to third quarter PAH concentrations trend upward. These upward trends may indicate a spill event or rainfall event which may have flushed stagnant contaminants from the stormsewer and any potentially connected lift stations. The trend of increased PAH concentrations continues to the fourth quarter.

Figure 5-1 presents graphs by stream segment that illustrate the sediment concentrations at 0-6 inches for the five PAHs which exceeded BHRA screening criteria in every sampling event [benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and chrysene]. Graphs are presented for those segments in which exceedance of screening criteria occurred. The graphs illustrate that typically the detected PAH concentrations follow the same trend (e.g., an increase in one PAH compound is associated with increases in the other detected PAH compounds). These relationships suggest that the PAHs detected within each segment have a common source of origin for that segment. The graphs also illustrate that the sampling quarter with the highest concentration of the PAHs varies between the sampling segments. This relationship suggests that multiple origins for the PAHs could exist. The segments that have similar trends, which would suggest a common source for them, are; QE02 and QE03; QE04, QE05, and QE06; and QW04 and QW05. Finally, the graphs illustrate that concentrations of analytes decrease off-base as compared to on-base. Exceedances of 10^{-6} screening criteria (BHRA and HHRA) occurred during only one quarter on a off-base portion of East Soldier Creek (QE10). Analysis from the downstream most segments of both East and West Soldier Creek did not exceed BHRA or HHRA screening criteria.

PAHs consist of two or more aromatic rings fused in linear, angular, or cluster arrangements containing only carbon and hydrogen atoms. Their chemical, physical, and biological properties vary based on their size and shape. In general, PAHs are poorly soluble in water explaining their low concentrations in the surface water in comparison with the sediment. The log octanol/water partition coefficients (log K_{ow}) for most PAHs range from 4 to 8, indicating that they are adsorbed by soils and sediments, limiting potential migration into deep soils and groundwater (USDHHS, 1990).

The primary source of release of PAHs to the environment occurs as a result of combustion emissions. Discharges may also occur from spills of fuel oils, gasoline, etc., or from runoff from sources such as roadways, asphalt parking lots or railroad ties.

5.2.1.4 Volatiles

Twenty-three volatile compounds were detected in sediment samples during the first year of quarterly monitoring. The compounds detected were: 1,1,2,2-tetrachloroethane, 1,2,3-

trichloropropane, 1,2-dichloroethane, 2-butanone (MEK), 2-hexanone, 4-methyl-2-pentanone (MIBK), acetone, acrolein, acrylonitrile, benzene, carbon disulfide, chlorobenzene, chloroform, chloromethane, ethylbenzene, methylene chloride, tetrachloroethene, toluene, trichloroethene, trans-1,2-dichloroethene, trans-1,4-dichloro-2-butene, vinyl chloride, xylenes (total).

The most frequently detected volatile compound was methylene chloride followed by acetone. Methylene chloride was detected in 97 analytical samples with a maximum concentration of 600 ug/kg, and average concentration of 15 ug/kg and minimum concentration of 1.3 ug/kg. The highest concentration of methylene chloride was detected in the sediment sample from QE08-301, collected from the pond on East Soldier Creek. The sample was collected during the third quarter in April 1995. Acetone was detected in 91 samples with a maximum concentration of 950 ug/kg. The highest concentration of acetone was also detected in QE08-301.

The highest volatile concentration was chlorobenzene (18,000 ug/kg) which was also detected in sediment sample QE08-301.

5.1.2.5 Tentatively Identified Compounds

A total of 667 tentatively identified compounds (TICs) were detected in sediments during quarterly monitoring. The most frequently detected TIC was the class of compounds "Saturated Hydrocarbon: >C20" which were detected in 79 samples. Table B-17, Appendix B, presents the frequency of detection, maximum, minimum and average concentrations for all TICs detected in the sediment. The sample location at which the maximum concentration of a TIC was detected is presented in Table B-18, Appendix B.

5.2.2 Surface Water

A total of 59 surface water samples were collected during the first year of quarterly monitoring. Total surface water samples collected from the first through fourth quarters were 15, 15, 16, and 13, respectively. The number of surface water samples varied quarterly due to the intermittent nature of the streams. Sample locations at segment QW01 and Tributary B were dry during all four quarterly sampling events. Sample locations at QW02 were dry also

except during the third quarterly sampling event. During the fourth quarterly sampling event, all sampling locations on-base West Soldier Creek were dry.

Appendix B contains tables which summarize analyte detections by quarter. Table 5-11 presents the frequency of detection, maximum, minimum, and average concentrations of analytes detected in surface water samples. Statistical summaries were calculated based on detected concentrations in analytical samples, excluding detections in QA/QC samples and non-detects. The sample location at which the maximum concentration of an analyte was detected is presented in Table 5-12. Table 5-13 presents a comparison of maximum analyte concentrations of the surface water samples for each quarter to the RI sampling results.

5.2.2.1 Metals

Twenty-one metals were detected during the four quarters of monitoring. Recoverable metals detected in surface water by Method 6010 were: aluminum, barium, cadmium, calcium, chromium, cobalt, copper, iron, magnesium, manganese, molybdenum, nickel, potassium, sodium, vanadium, and zinc. Metals detected by Methods 7060, 7421, 7470/7471, 7740, and 7841 were arsenic, lead, mercury, selenium, and thallium, respectively.

The most frequently detected metals and their maximum concentrations were barium (0.68 mg/L), calcium (99.6 mg/L), copper (0.3 mg/L), magnesium (45.7 mg/L), manganese (0.44 mg/L), and zinc (0.068 mg/L). These metals were detected in all 59 surface water samples collected during the first year of quarterly monitoring.

The highest metal concentration was sodium (203 mg/L) from sample QE10-101, collected downstream of Douglas Boulevard on off-base East Soldier Creek. The sample was collected the during the first quarter sampling event, in November 1994. Sodium was detected in 57 analytical samples. The average and lowest concentrations of sodium from the first year of quarterly monitoring were 42.3 mg/L, and 0.6 mg/L, respectively.

Metals concentrations did not exceed BHRA or HHRA screening criteria in any surface water samples.

5.2.2.2 PCBs and Chlorinated Pesticides

Aldrin was the only pesticide detected in surface water during the first year of quarterly monitoring. Aldrin was detected in two surface water samples. The highest concentration of aldrin (0.086 ug/kg) was detected in sample QE10-201, collected downstream of Douglas Boulevard, on off-base East Soldier Creek. The sample was collected during the second quarter sampling event in January 1995. When pesticides or PCBs were detected in an analytical sample, a second column was run. The maximum result of the two columns were reported for the pesticide or PCB concentration in an analytical sample.

PCB and pesticide concentrations did not exceed risk based screening criteria in any surface water samples.

5.2.2.3 Semivolatiles

Ten semivolatiles compounds were detected in surface water samples collected during the first year of quarterly monitoring. The semivolatile compounds detected were: 3/4-methylphenol, 4-nitrophenol, benzoic acid, benzyl alcohol, bis(2-ethylhexyl)phthalate, diethyl phthalate, fluoranthene, N-nitroso-di-n-propylamine, phenanthrene, and phenol. Phenol and bis(2-ethylhexyl)phthalate, each reported in nine surface water samples, were the most frequently detected semivolatiles. Bis(2-ethylhexyl)phthalate is specified as a common laboratory contaminants (EPA, 1994).

Semivolatile concentrations did not exceed risk based screening criteria in any surface water samples.

5.2.2.4 Volatiles

Eleven volatile compounds were detected in surface water during the first year of quarterly monitoring. The volatile compounds detected were: 2-butanone (MEK), acetone, bromoform, carbon disulfide, chlorobenzene, chloroform, methylene chloride, tetrachloroethene, trichloroethene, toluene, and vinyl chloride.

The highest volatile compound concentration was methylene chloride (150 ug/L) detected in sample QE09-201. This sample was collected just above the IWTP on East Soldier Creek,

during the second quarter sampling event in January 1995. Methylene chloride was also the most frequently detected volatile compound being reported in 59 surface water samples.

Volatiles concentrations did not exceed risk based screening criteria in any surface water samples.

5.2.2.5 Tentatively Identified Compounds

A total of 147 TICs were detected in surface water during quarterly monitoring. The most frequently detected TICs were 2H-Inbdol-2-one, 7-(diethylamino) and the class of compounds called "Oxygenated Hydrocarbons" which were both detected in 20 surface water samples. Table B-19, Appendix B, presents the frequency of detection, maximum, minimum and average concentrations for the TICs detected in surface water. The sample location at which the maximum concentration of a TIC was detected is presented in Table B-20, Appendix B.

FIGURE 5-1
MAJOR PAH CONCENTRATIONS FOR SAMPLE SEGMENTS IN WHICH EXCEEDANCES OF BHRA CRITERIA OCCURRED IN SEDIMENT (0-6 inches bgs)

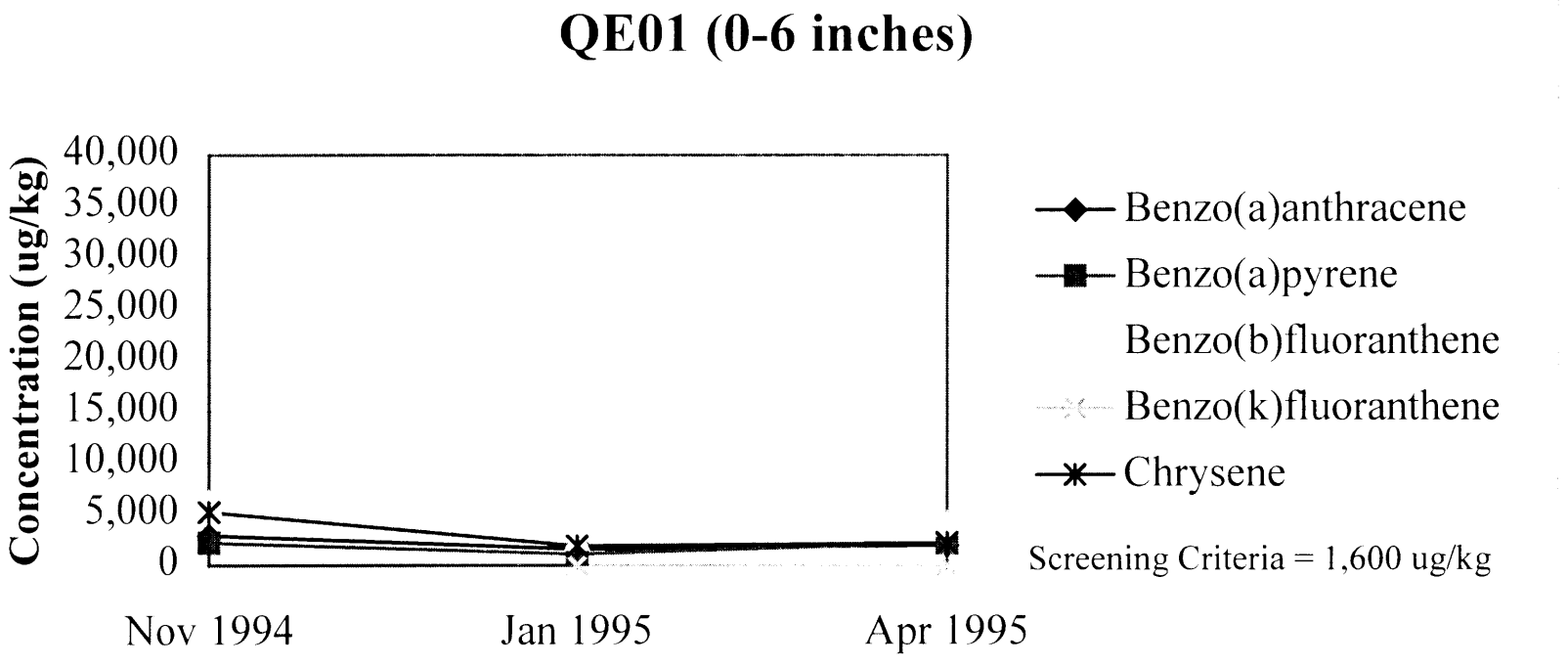


FIGURE 5-1
MAJOR PAH CONCENTRATIONS FOR SAMPLE SEGMENTS IN WHICH EXCEEDANCES OF BHRA CRITERIA OCCURRED IN SEDIMENT (0-6 inches bgs)

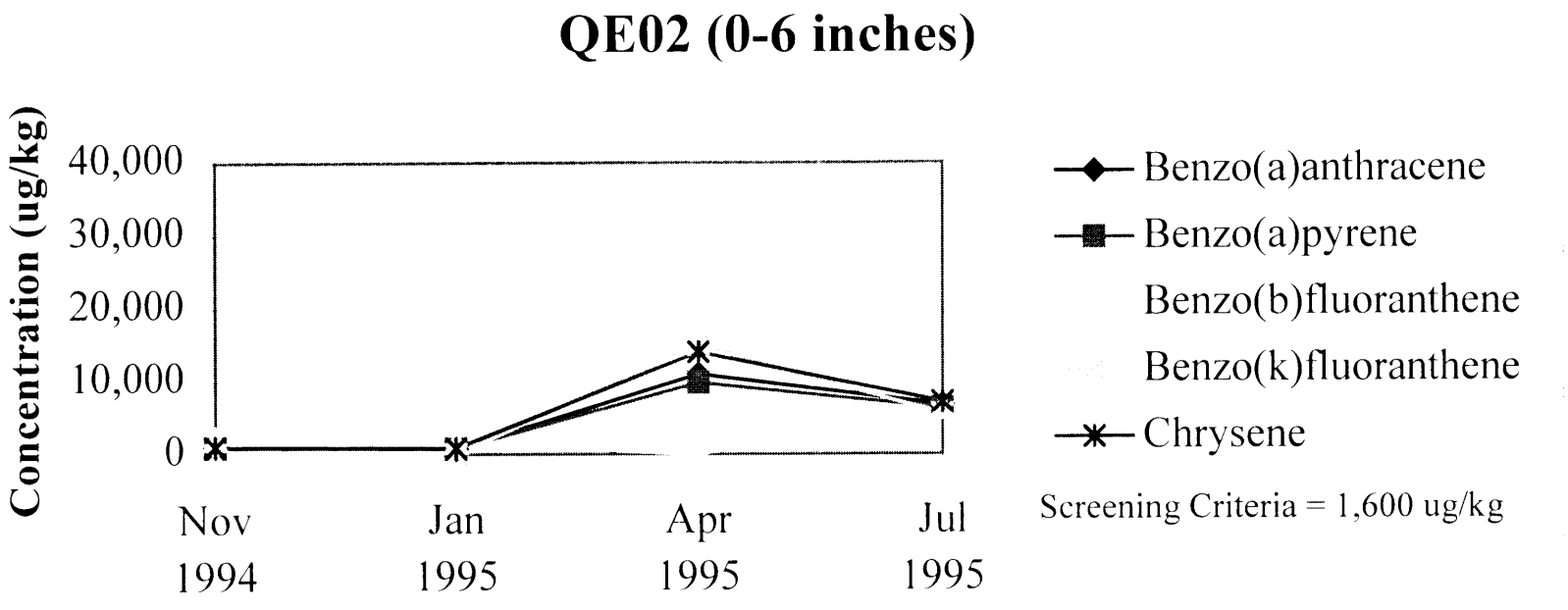


FIGURE 5-1
MAJOR PAH CONCENTRATIONS FOR SAMPLE SEGMENTS IN WHICH EXCEEDANCES OF BHRA CRITERIA OCCURRED IN SEDIMENT (0-6 inches bgs)

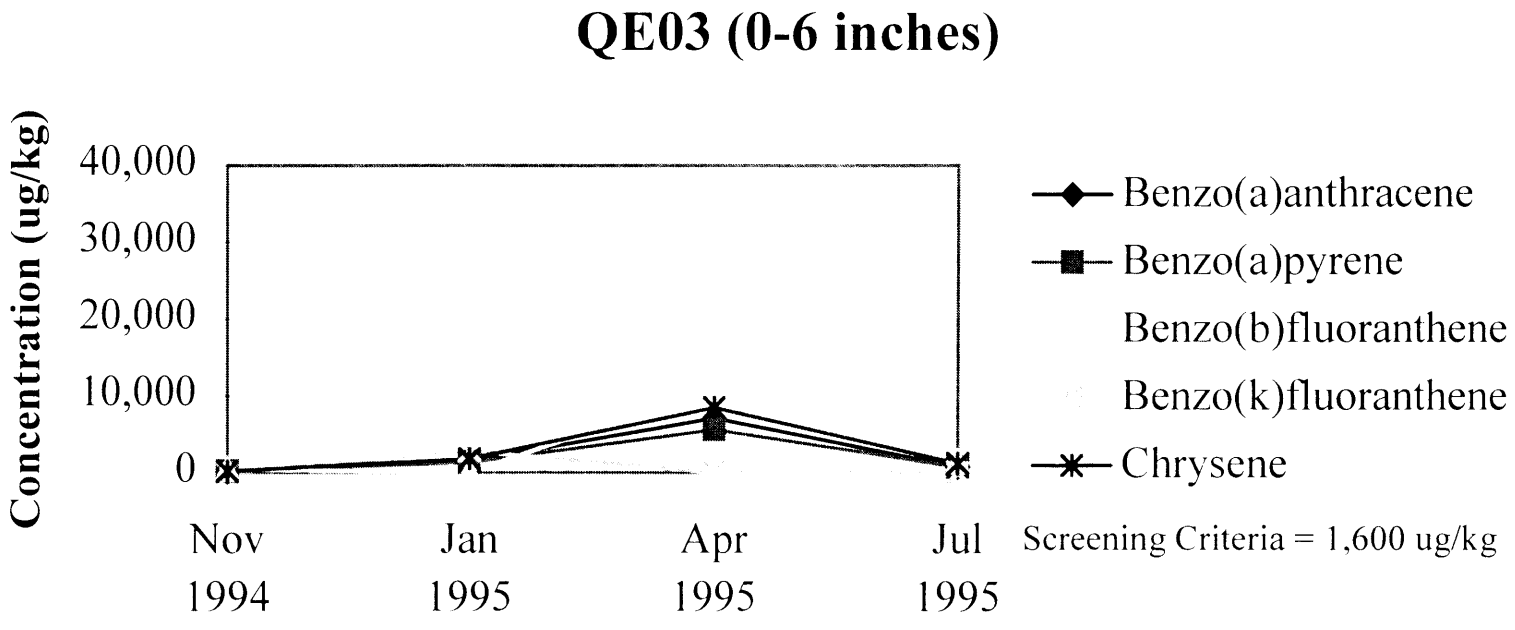


FIGURE 5-1
MAJOR PAH CONCENTRATIONS FOR SAMPLE SEGMENTS IN WHICH EXCEEDANCES OF BHRA CRITERIA OCCURRED IN SEDIMENT (0-6 inches bgs)

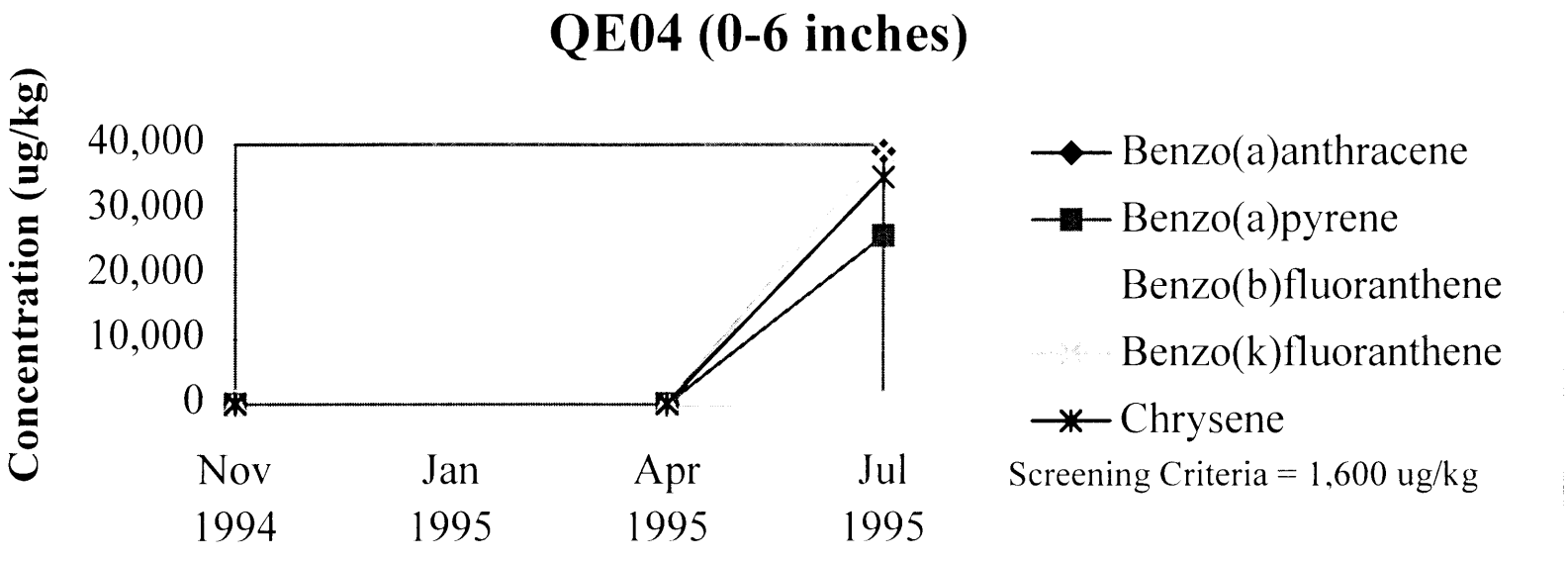


FIGURE 5-1
MAJOR PAH CONCENTRATIONS FOR SAMPLE SEGMENTS IN WHICH EXCEEDANCES OF BHRA CRITERIA OCCURRED IN SEDIMENT (0-6 inches bgs)

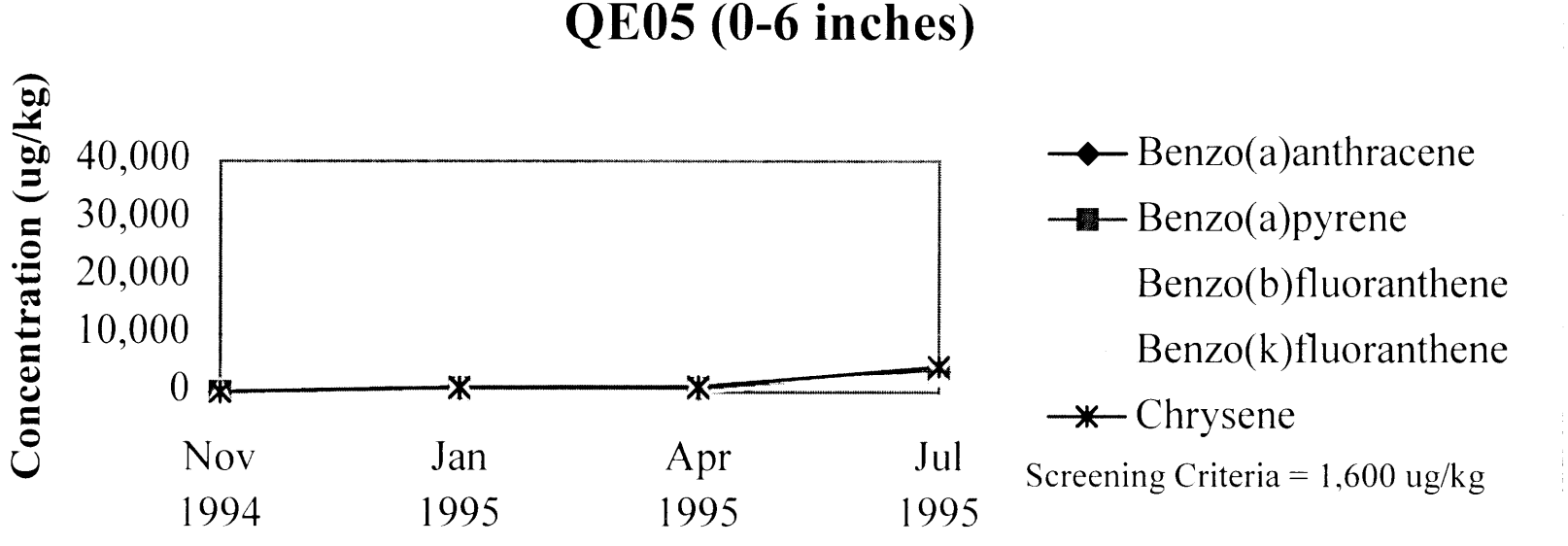


FIGURE 5-1
MAJOR PAH CONCENTRATIONS FOR SAMPLE SEGMENTS IN WHICH EXCEEDANCES OF BHRA CRITERIA OCCURRED IN SEDIMENT (0-6 inches bgs)

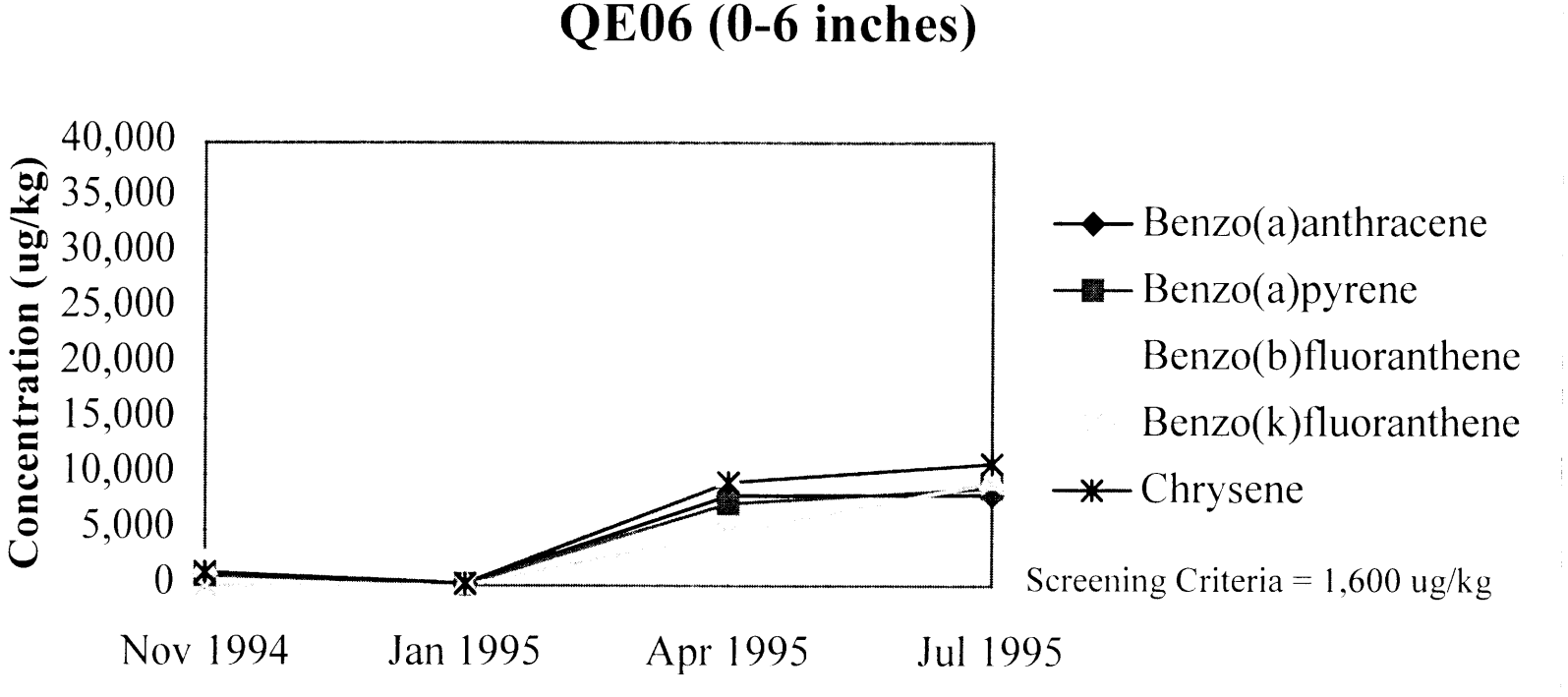


FIGURE 5-1
MAJOR PAH CONCENTRATIONS FOR SAMPLE SEGMENTS IN WHICH EXCEEDANCES OF BHRA CRITERIA OCCURRED IN SEDIMENT (0-6 inches bgs)

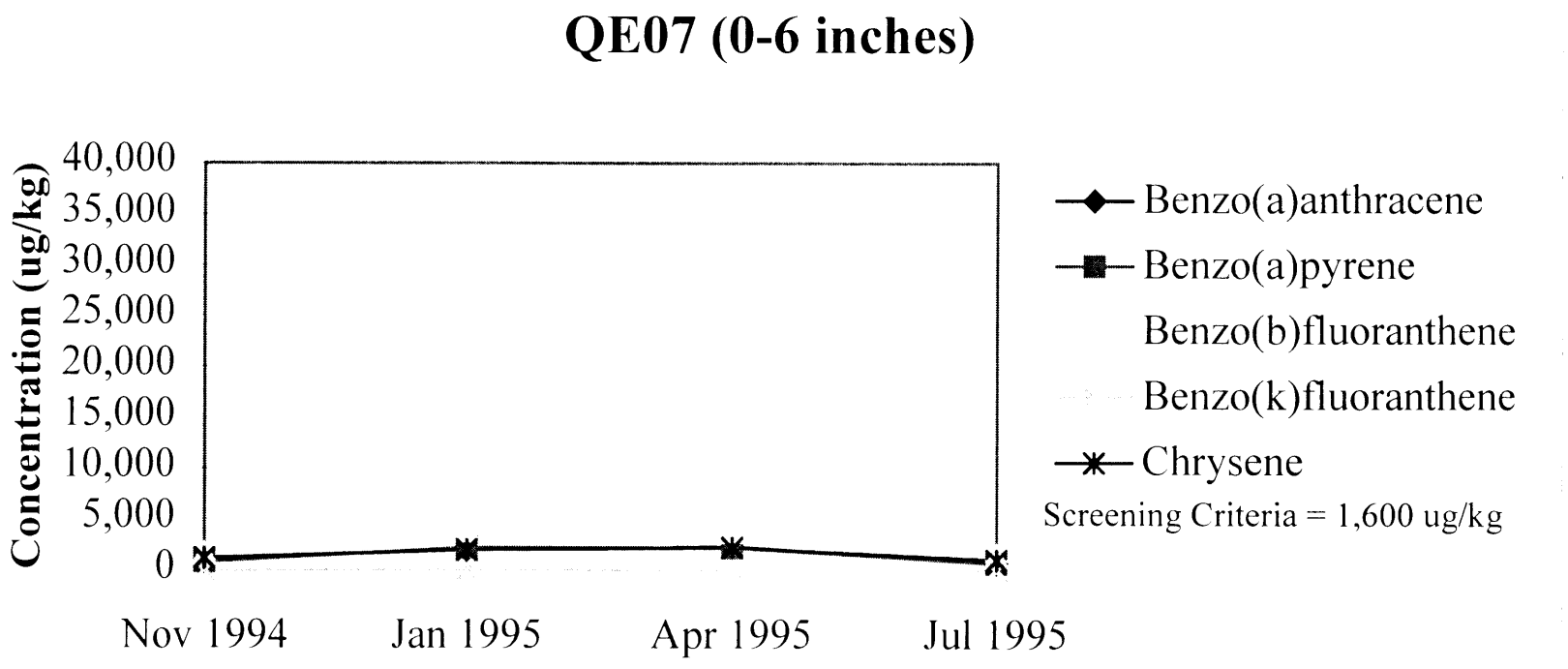


FIGURE 5-1
MAJOR PAH CONCENTRATIONS FOR SAMPLE SEGMENTS IN WHICH EXCEEDANCES OF BHRA CRITERIA OCCURRED IN SEDIMENT (0-6 inches bgs)

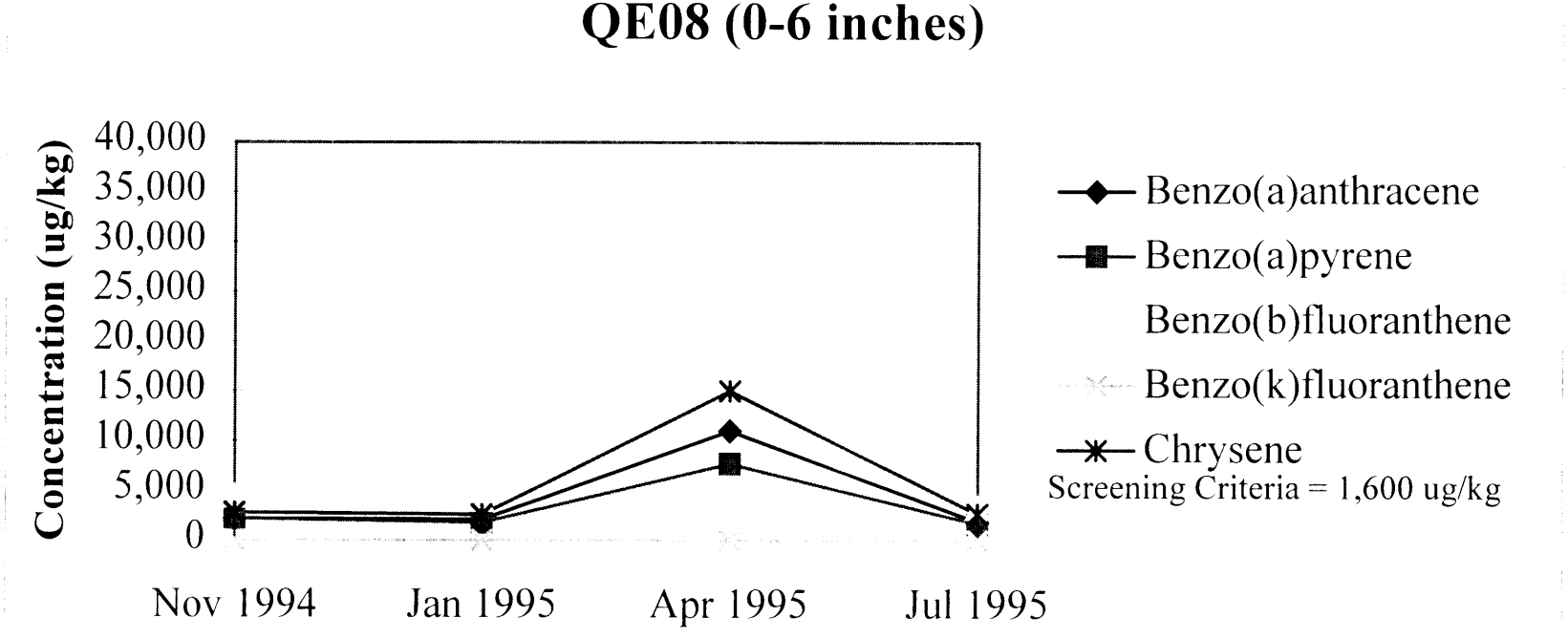


FIGURE 5-1
MAJOR PAH CONCENTRATIONS FOR SAMPLE SEGMENTS IN WHICH EXCEEDANCES OF BHRA CRITERIA OCCURRED IN SEDIMENT (0-6 inches bgs)

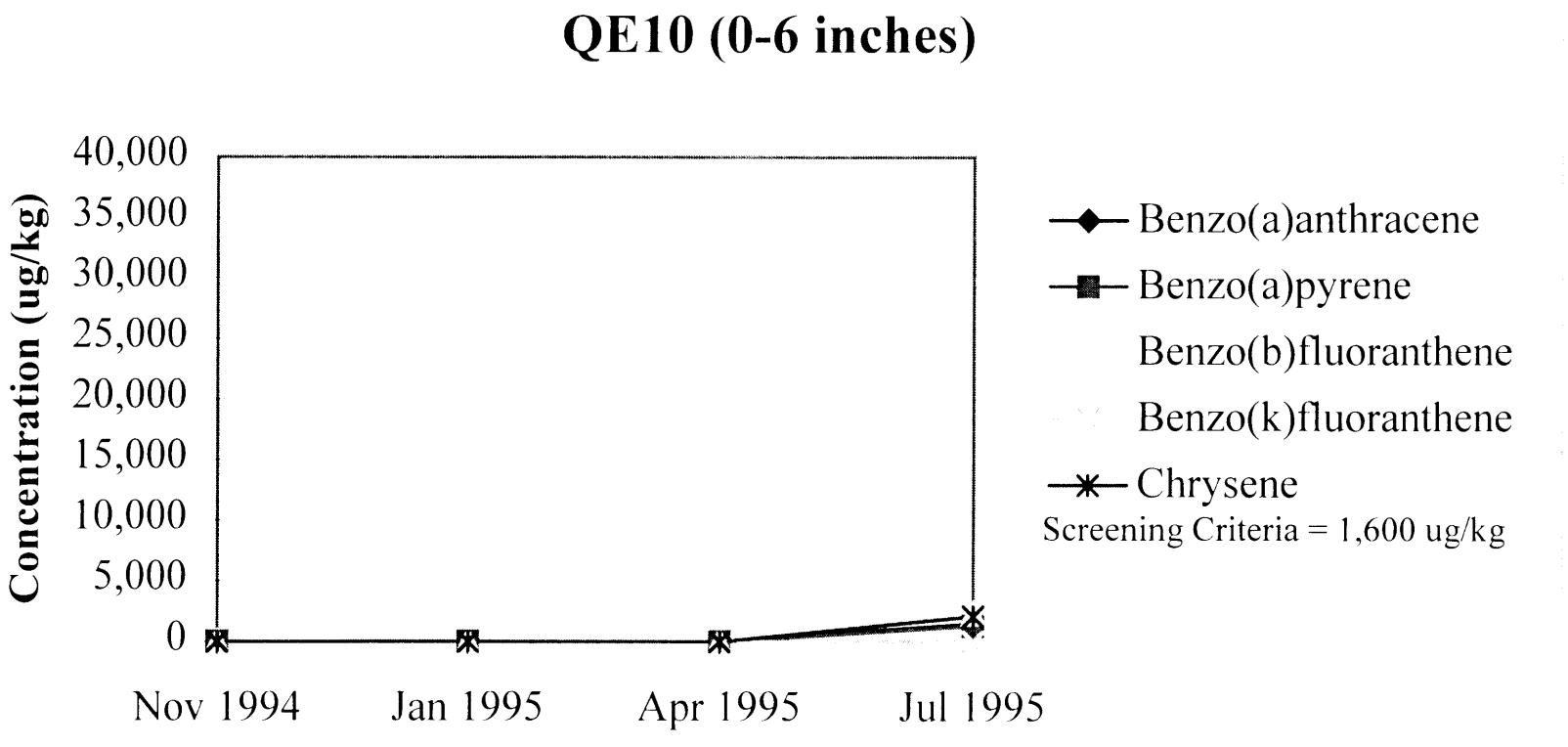


FIGURE 5-1
MAJOR PAH CONCENTRATIONS FOR SAMPLE SEGMENTS IN WHICH EXCEEDANCES OF BHRA CRITERIA OCCURRED IN SEDIMENT (0-6 inches bgs)

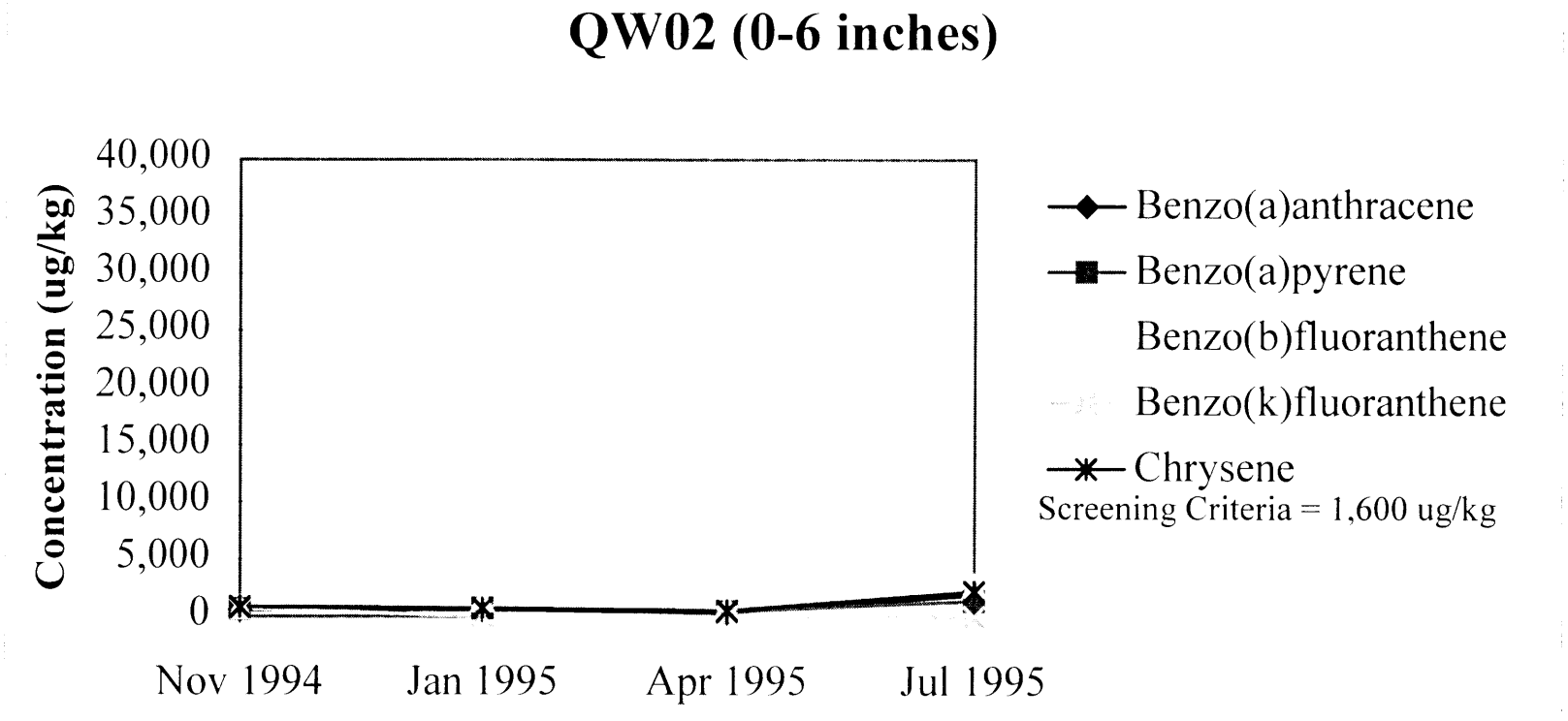


FIGURE 5-1
MAJOR PAH CONCENTRATIONS FOR SAMPLE SEGMENTS IN WHICH EXCEEDANCES OF BHRA CRITERIA OCCURRED IN SEDIMENT (0-6 inches bgs)

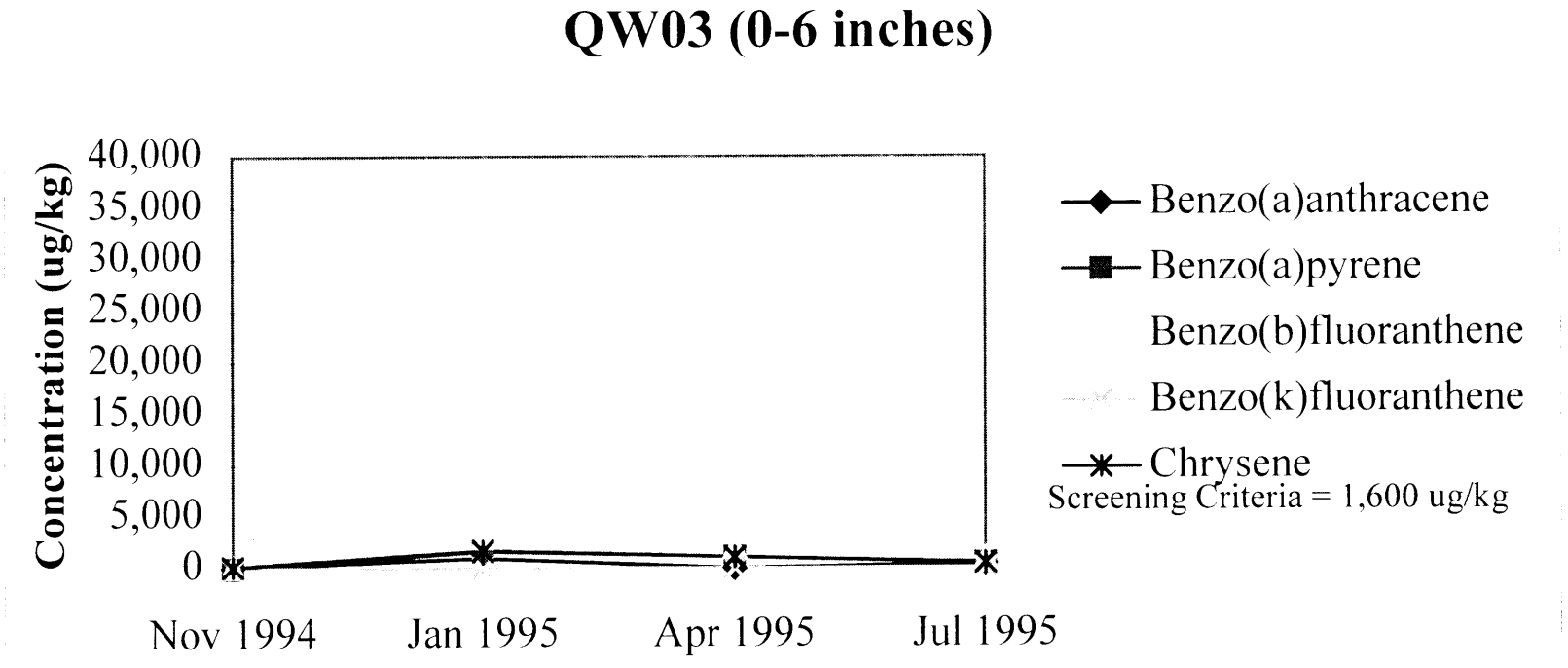


FIGURE 5-1
MAJOR PAH CONCENTRATIONS FOR SAMPLE SEGMENTS IN WHICH EXCEEDANCES OF BHRA CRITERIA OCCURRED IN SEDIMENT (0-6 inches bgs)

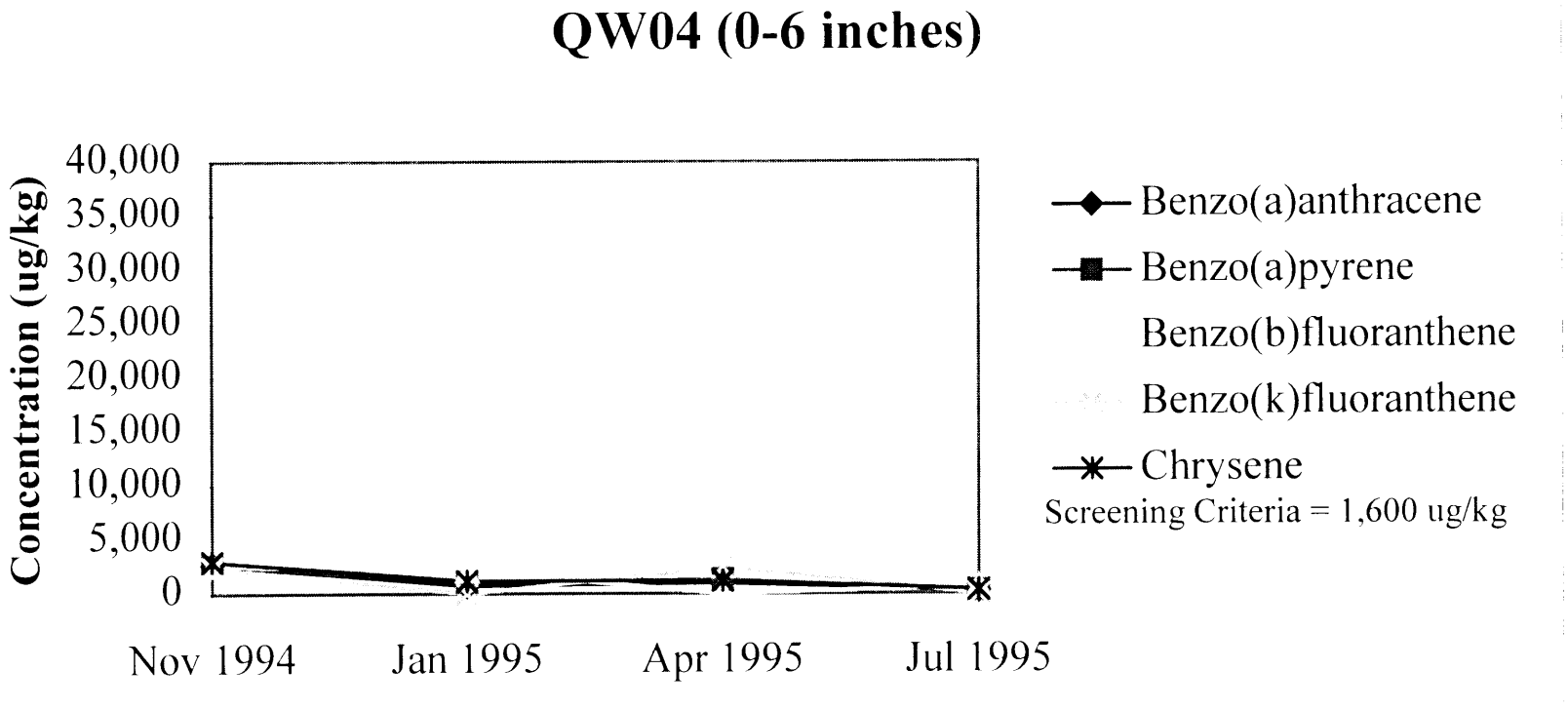


FIGURE 5-1
MAJOR PAH CONCENTRATIONS FOR SAMPLE SEGMENTS IN WHICH EXCEEDANCES OF BHRA CRITERIA OCCURRED IN SEDIMENT (0-6 inches bgs)

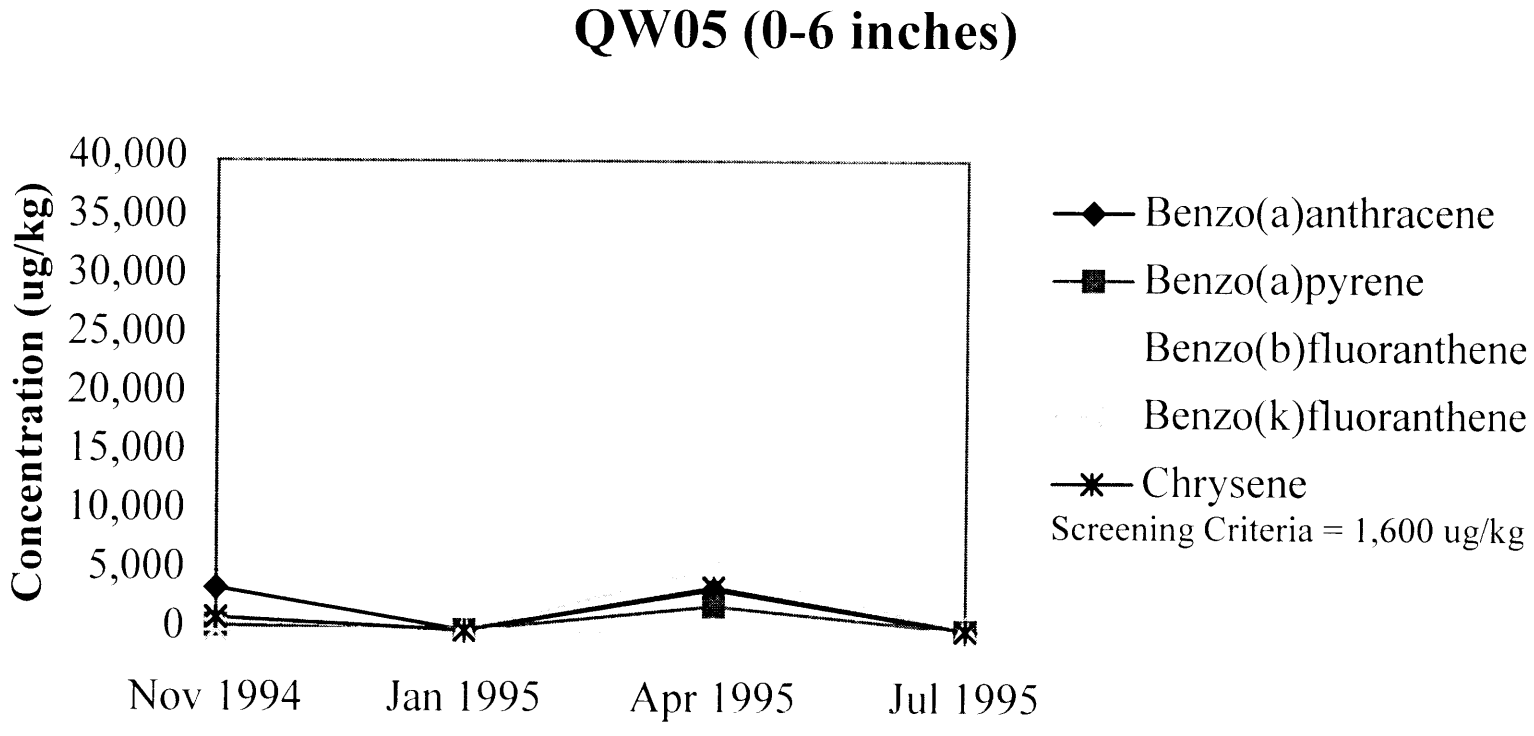


TABLE 5-1
CARCINOGENIC AND NON-CARCINOGENIC
BASELINE HEALTH RISK ASSESSMENT (BHRA) SCREENING CRITERIA FOR SEDIMENT

Compound Name	Non-Caracinogenic	Carcinogenic 10-6	Carcinogenic 10-4
Inorganics (mg/kg)			
Arsenic	2.10E+06		
Mercury	6.20E+05		
Barium	1.40E+08		
Cadmium	1.00E+06		
Chromium	1.00E+07		
Manganese	2.10E+08		
Nickel	4.10E+07		
Silver	6.20E+06		
Vanadium	1.40E+07		
Zinc	4.10E+08		
Semivolatile Organics (ug/kg)			
1,2-Dichlorobenzene	7.90E+08		
1,4-Dichlorobenzene		1.00E+06	1.00E+08
2,4-Dimethylphenol	1.80E+08		
2-Methylphenol	4.40E+08		
3/4-Methylphenol	4.40E+08		
Acenaphthene	3.80E+07		
Anthracene	1.90E+08		
Benzo(a)anthracene		1.60E+03	1.60E-05
Benzo(a)pyrene		1.60E+03	1.60E-05
Benzo(b)fluoranthene		1.60E+03	1.60E-05
Benzo(k)fluoranthene		1.60E+03	1.60E+05
bis(2-Ethylhexyl)^phthalate	1.30E+07	1.00E+05	1.00E+07
Butyl benzyl phthalate	1.30E+08		
Chrysene		1.60E+03	1.60E+05
Dibenz(a,h)anthracene		1.20E+05	1.20E+07
Fluoranthene	2.50E+07		
Fluorene	2.50E+07		
Indeno(1,2,3-cd)pyrene		1.20E+05	1.20E+07
Naphthalene	2.50E+06		
Pyrene	1.90E+07		
Volatile Organics (ug/kg)			
Acetone	4.10E+07		
Benzene		3.30E+04	3.30E+06
Carbon disulfide	5.70E+08		
Chlorobenzene	8.30E+06		
Chloroform	4.10E+06	1.60E+05	1.60E+07
cis-1,2-Dichloroethene			
Ethylbenzene	5.70E+08		
Methylene chloride	2.50E+07	1.30E+05	1.30E+07
Tetrachloroethene	4.10E+06	1.90E+04	1.90E+06
Toluene	8.30E+07		
trans-1,2-Dichloroethene			
Trichloroethene		1.40E+06	1.40E+08
Vinyl acetate	5.70E+09		
Xylenes (total)	8.30E+08		

TABLE 5-2
CARCINOGENIC AND NON-CARCINOGENIC
BASELINE HEALTH RISK ASSESSMENT (BHRA) SCREENING CRITERIA FOR SURFACE WATER

Compound Name	Non-Caracinogenic	Carcinogenic 10-6	Carcinogenic 10-4
Inorganics (mg/L)			
Arsenic	8.10E+00		
Barium	2.50E+02		
Beryllium	1.50E+02		
Cadmium	2.10E+00		
Chromium	1.10E+01		
Manganese	3.50E+02		
Nickel	6.20E+01		
Silver	3.50E+02		
Vanadium	5.60E+02		
Zinc	1.30E+03		
Semivolatile Organics (ug/L)			
Benzoic acid	1.00E+05		
Chrysene		1.20E+03	1.20E+05
Fluoranthene	2.20E+04		
Pyrene	5.90E+06		
Volatile Organics (ug/L)			
1,1,1-Trichloroethane	1.10E+05		
Acetone	5.00E+05		
Benzene		2.00E+01	2.00E+03
Bromodichloromethane	8.40E+05	1.70E+03	1.70E+05
Bromoform	1.90E+06	3.30E+04	3.30E+06
Carbon disulfide	5.30E+03		
Chlorobenzene	1.30E+04		
Chloroform	2.00E+04	7.60E+02	7.60E+04
cis-1,2-Dichloroethene			
Dibromochloromethane	1.30E+06	2.00E+03	2.00E+05
Methylene chloride	1.70E+05	8.90E+02	8.90E+04
Tetrachloroethene	5.70E+04	3.10E+02	3.10E+04
Toluene	5.60E+03		
trans-1,2-Dichloroethene			
Trichloroethene		2.80E+02	2.80E+04
Xylenes (total)	1.10E+07		

TABLE 5-3

CARCINOGENIC AND NON-CARCINOGENIC HUMAN HEALTH RISK ASSESSMENT (HHRA) SCREENING CRITERIA FOR SEDIMENT

Chemical	Reasonable Maximum Exposure (mg/kg)	Total Hazard Quotient	Total Cancer Risk	Non-carcinogenic [a] Action Level (mg/kg)	Carcinogenic [b] Action (Risk = 1 x 10^{-6}) (mg/kg)	Carcinogenic [b] Action (Risk = 1 x 10^{-5}) (mg/kg)	Carcinogenic [b] Action (Risk = 1 x 10^{-4}) (mg/kg)
Inorganics							
Antimony	6.42E+00	3.69E-03		1.74E+03			
Beryllium	5.61E-01	2.58E-05	2.38E-07	2.18E+04	2.36E+00	2.36E+01	2.36E+02
Cadmium	1.23E+02	2.83E-02		4.35E+03			
Chromium	7.64E+02	8.94E-06		1.00E+06[c]			
Cobalt	8.22E+00	3.15E-05		2.61E+05			
Lead	1.62E+02						
Mercury	1.64E-01	1.26E-04		1.31E+03			
Nickel	2.09E+02	2.40E-03		8.71E+04			
Silver	4.95E+00	2.28E-04		2.18E+04			
Thallium	1.09E+00	3.13E-03		3.48E+02			
Vanadium	2.03E+01	6.66E-04		3.05E+04			
Pesticides and PCBs							
Aldrin	4.50E-02	4.53E-04	9.91E-08	9.93E+01	4.54E-01	4.54E+00	4.54E+01
alpha-BHC	2.00E-03		1.63E-09		1.23E+00	1.23E+01	1.23E+02
alpha-Chlordane	7.48E-02	3.77E-04	1.26E-08	1.99E+02	5.94E+00	5.94E+01	5.94E+02
Aroclor 1254	1.70E+00	2.57E-02		6.62E+01			
delta-BHC	1.27E-01						
Heptachlor	9.70E-01	5.86E-04	5.65E-07	1.65E+03	1.72E+00	1.72E+01	1.72E+02
Volatiles							
2-Butanone (MEK)	6.66E-03	3.36E-09		1.00E+06[c]			
Acetone	3.98E-02	1.20E-07		3.31E+05			
Acrylonitrile	4.50E-03	4.53E-05	9.91E-09	9.93E+01	4.54E-01	4.54E+00	4.54E+01
Benzene	5.60E-03		1.68E-12		3.33E+03	3.33E+04	3.33E+05
Carbon disulfide	9.47E-03	2.86E-08		3.31E+05			
Chlorobenzene	7.00E-03	1.06E-07		6.62E+04			
Ethylbenzene	1.30E-02	3.77E-09		1.00E+06[c]			
Methylene chloride	6.95E-03	3.50E-08	6.75E-12	1.99E+05	1.03E+03	1.03E+04	1.03E+05
Tetrachloroethene	5.45E-03	1.58E-08		3.45E+05			
Toluene	2.20E-03	3.32E-09		6.62E+05			
trans-1,2-Dichloroethene	1.50E-03	2.27E-08		6.62E+04			
Trichloroethene	1.07E-02	5.16E-08	1.22E-12	2.07E+05	8.79E+03	8.79E+04	8.79E+05
Vinyl chloride	5.66E-03		1.11E-10		5.09E+01	5.09E+02	5.09E+03
Xylenes (total)	3.25E-02	4.71E-10		1.00E+06[c]			
Semivolatiles							
1,2,4-Trichlorobenzene	4.30E-01	8.25E-07		5.21E+05			
1,2-Dichlorobenzene	5.07E-01	1.63E-07		1.00E+06[c]			
1,3-Dichlorobenzene	2.79E+00	9.08E-07		1.00E+06[c]			
1,4-Dichlorobenzene	2.10E-01		5.21E-11		4.03E+03	4.03E+04	4.03E+05

CARCINOGENIC AND NON-CARCINOGENIC HUMAN HEALTH RISK ASSESSMENT (HHRA) SCREENING CRITERIA FOR SEDIMENT

Chemical	Reasonable Maximum Exposure (mg/kg)	Total Hazard Quotient	Total Cancer Risk	Non-carcinogenic [a] Action Level (mg/kg)	Carcinogenic [b] Action (Risk = 1 x 10^{-6}) (mg/kg)	Carcinogenic [b] Action (Risk = 1 x 10^{-5}) (mg/kg)	Carcinogenic [b] Action (Risk = 1 x 10^{-4}) (mg/kg)
1-Chloronaphthalene	1.30E+00	1.31E-05		9.93E+04			
2,4-Dimethylphenol	3.50E-01	5.07E-07		6.91E+05			
2-Chloronaphthalene	6.90E-02	2.61E-07		2.65E+05			
2-Methylnaphthalene	1.10E-01	1.11E-06		9.93E+04			
3/4-Methylphenol	1.60E-01	9.67E-07		1.65E+05			
Acenaphthene	2.41E-01	1.21E-06		1.99E+05			
Acenaphthylene	3.90E+00	3.77E-06		1.00E+06[c]			
Anthracene	7.50E-02	7.56E-08		9.93E+05			
Benzidine	1.19E+01	1.15E-04	2.83E-05	1.04E+05	4.20E-01	4.20E+00	4.20E+01
Benzo(a)anthracene	3.23E+00		3.05E-07		1.06E+01	1.06E+02	1.06E+03
Benzo(a)pyrene	1.52E+00		1.43E-06		1.06E+00	1.06E+01	1.06E+02
Benzo(b)fluoranthene	7.61E-01		7.19E-08		1.06E+01	1.06E+02	1.06E+03
Benzo(g,h,i)perylene	6.00E-01	6.04E-06		9.93E+04			
Benzo(k)fluoranthene	5.51E-01		5.21E-09		1.06E+02	1.06E+03	1.06E+04
Benzoic acid	1.70E-01	1.23E-09		1.00E+06[c]			
bis(2-Ethylhexyl)phthalate	4.90E+00		8.89E-09		5.51E+02	5.51E+03	5.51E+04
Butyl benzyl phthalate	3.70E-01	5.36E-08		1.00E+06[c]			
Chrysene	3.70E+00		3.50E-09		1.06E+03	1.06E+04	1.06E+05
Di-n-butyl phthalate	3.40E-02	1.03E-07		3.31E+05			
Di-n-octyl phthalate	7.70E-02	1.16E-06		6.62E+04			
Dibenz(a,h)anthracene	1.70E-01		1.61E-07		1.06E+00	1.06E+01	1.06E+02
Dibenzofuran	2.13E-01	1.61E-05		1.32E+04			
Dimethyl phthalate	4.50E-02	1.36E-09		1.00E+06[c]			
Fluoranthene	5.30E+00	4.00E-05		1.32E+05			
Fluorene	1.71E+00	1.24E-06		1.00E+06[c]			
Indeno(1,2,3-cd)pyrene	5.38E-01		5.09E-08		1.06E+01	1.06E+02	1.06E+03
Naphthalene	4.50E-01	4.34E-07		1.00E+06[c]			
Phenanthrene	7.27E-01	7.32E-06		9.93E+04			
Phenol	6.30E-02	3.17E-08		1.00E+06[c]			
Pyrene	6.40E+00	6.45E-05		9.93E+04			

Note: a). Action level = (Risk Assessment Conc/HQ) x HI where HI = 1.0

b). Action level = (Risk Assessment Conc/Cancer risk) x Target cancer Risk

c). Calculated action level is greater than 100% concentration and 100% concentration is assigned as the cleanup goal

CARCINOGENIC AND NON-CARCINOGENIC HUMAN HEALTH RISK ASSESSMENT (HHRA) SCREENING CRITERIA FOR SURFACE WATER

Chemical	Reasonable Maximum Exposure (mg/L)	Total Hazard Quotient	Total Cancer Risk	Non-carcinogenic [a] Action Level (mg/L)	Carcinogenic [b] Action (Risk = 1 x 10^{-6}) (mg/L)	Carcinogenic [b] Action (Risk = 1 x 10^{-5}) (mg/L)	Carcinogenic [b] Action (Risk = 1 x 10^{-4}) (mg/L)
Inorganics							
Arsenic	1.40E-03	1.65E-03	3.18E-07	8.50E-01	4.41E-03	4.41E-02	4.41E-01
Cadmium	2.64E-03	1.88E-03		1.40E+00			
Cobalt	5.23E-03	3.10E-05		1.68E+02			
Molybdenum	2.64E-01	1.22E-03		2.16E+02			
Nickel	2.99E-02	5.92E-04		5.06E+01			
Thallium	1.20E-03	5.29E-03		2.27E-01			
Vanadium	6.66E-03	3.46E-04		1.92E+01			
Pesticides and PCBs							
Aldrin	5.36E-05	7.82E-04	1.71E-07	6.85E-02	3.13E-04	3.13E-03	3.13E-02
Volatile Organics							
2-Butanone (MEK)	2.80E-03	3.65E-08		7.67E+04			
Acetone	5.30E-03	1.64E-05		3.23E+02			
Bromoform	2.46E-03	9.64E-07	5.44E-11	2.56E+03	4.53E+01	4.53E+02	4.53E+03
Carbon disulfide	1.00E-03	1.60E-08		6.25E+04			
Chlorobenzene	1.80E-03	7.05E-07		2.56E+03			
Chloroform	1.80E-03	1.41E-06	3.07E-11	1.28E+03	5.86E+01	5.86E+02	5.86E+03
Methylene chloride	1.25E-02	6.44E-05	1.24E-08	1.94E+02	1.00E+00	1.00E+01	1.00E+02
Tetrachloroethene	9.79E-03	7.66E-06		1.28E+03			
Toluene	1.70E-03	6.65E-08		2.56E+04			
Trichloroethene	1.00E-02	1.31E-05	3.09E-10	7.67E+02	3.25E+01	3.25E+02	3.25E+03
Vinyl chloride	1.00E-03		5.31E-09		1.88E-01	1.88E+00	1.88E+01
Semivolatile Organics							
3/4-Methylphenol	1.70E-03	9.66E-06		1.76E+02			
4-Nitrophenol	2.00E-03	3.34E-05		5.99E+01			
Benzoic acid	3.90E-03	7.63E-09		5.11E+05			
Benzyl alcohol	1.70E-03	4.44E-08		3.83E+04			
bis(2-Ethylhexyl)phthalate	3.60E-03	3.10E-04	3.72E-08	1.16E+01	9.67E-02	9.67E-01	9.67E+00
Fluoranthene	1.50E-03	2.94E-07		5.11E+03			
N-Nitroso-di-n-propylamine	1.80E-03		3.67E-07		4.91E-03	4.91E-02	4.91E-01
Phenol	1.40E-03	3.12E-07		4.49E+03			

Note: a) Action level = (Risk Assessment Conc/HQ) x HI where HI = 1.0

b) Action level = (Risk Assessment Conc/Cancer risk) x Target cancer Risk

TABLE 5-5
STATISTICAL EVALUATION OF ANALYTES DETECTED IN SEDIMENT SAMPLES

Compound Name	Frequency of Detection	Average Result	Maximum Result	Minimum Result
Inorganics (mg/kg)				
Aluminum	137	6864.45	23400	304
Antimony	13	7.31	9.8	4.5
Barium	137	610.96	4700	14.4
Beryllium	108	0.58	1.9	0.13
Cadmium	111	33.65	415	0.63
Calcium	137	39006.07	210000	471
Chromium	137	237.77	3210	6.7
Cobalt	132	11.22	126	1.3
Copper	137	91.18	2210	2.3
Iron	137	11531.68	28500	1160
Lead	126	108.88	4400	4.8
Magnesium	137	5308.63	30600	122
Manganese	137	438.14	4250	20.6
Molybdenum	79	8.95	62.6	0.56
Nickel	136	160.12	3160	1.7
Potassium	128	1055.52	4880	140
Silver	79	12.78	205	0.4
Sodium	27	366.14	1890	75.9
Vanadium	137	21.62	95.7	1.8
Zinc	137	146.59	1790	4.1
Arsenic	135	2.66	9	0.35
Mercury	64	0.27	0.9	0.063
Selenium	33	1.29	12	0.14
Thallium	14	0.17	0.38	0.0018
Pesticides and PCBs (ug/kg)				
Aldrin	22	73.05	840	1.1
Aroclor 1254	80	3328.65	40000	33
Endosulfan sulfate	1	33.00	41	25
Endrin	1	1.65	2	1.3
Heptachlor	23	2872.89	52000	1.7
Heptachlor epoxide	2	123.00	210	36
Methoxychlor	1	18.00	19	17
alpha-BHC	1	1.85	2	1.7
alpha-Chlordane	1	910.00	910	910
delta-BHC	4	91.33	370	1.1
Volatile Organics (ug/kg)				
1,1,2,2-Tetrachloroethane	2	2.55	2.6	2.5
1,2,3-Trichloropropane	1	1.70	1.7	1.7
1,2-Dichloroethane	3	4.63	6.8	2.1
2-Butanone (MEK)	51	72.87	2900	1.3
2-Hexanone	1	14.00	14	14
4-Methyl-2-pentanone ^(MIBK)	1	5.00	5	5
Acetone	91	58.67	950	2.5
Acrolein	1	10.00	10	10
Acrylonitrile	2	3.35	4.5	2.2
Benzene	5	2.52	5.6	1.5
Carbon disulfide	21	5.77	21	1.2
Chlorobenzene	33	725.85	18000	1.4
Chloroform	1	2.50	2.5	2.5
Chloromethane	2	2.55	3.3	1.8
Ethylbenzene	4	10.78	35	2.3
Methylene chloride	97	14.75	600	1.3

TABLE 5-5
STATISTICAL EVALUATION OF ANALYTES DETECTED IN SEDIMENT SAMPLES

Compound Name	Frequency of Detection	Average Result	Maximum Result	Minimum Result
Tetrachloroethene	9	7.34	17	1.4
Toluene	34	44.53	1100	1.3
Trichloroethene	7	15.31	77	1.7
Vinyl chloride	2	14.00	15	13
Xylenes (total)	6	16.25	84	1.7
trans-1,2-Dichloroethene	1	1.50	1.5	1.5
trans-1,4-Dichloro-^2-butene	1	1.20	1.2	1.2
Semivolatile Organics (ug/kg)				
1,2-Dichlorobenzene	11	467.09	2200	48
1,3-Dichlorobenzene	1	100.00	100	100
1,4-Dichlorobenzene	8	121.75	280	46
1-Chloronaphthalene	19	1062.63	5200	54
2,4-Dimethylphenol	5	122.20	350	50
2-Chloronaphthalene	14	456.57	1400	51
2-Methylnaphthalene	18	266.83	1200	42
3/4-Methylphenol	6	118.67	220	46
Acenaphthene	48	620.71	8000	41
Acenaphthylene	1	44.00	44	44
Acetophenone	2	107.50	130	85
Anthracene	65	1221.66	26000	49
Benzidine	2	295.00	430	160
Benzo(a)anthracene	95	2253.56	39000	41
Benzo(a)pyrene	93	2037.34	26000	46
Benzo(b)fluoranthene	97	2725.72	28000	40
Benzo(g,h,i)perylene	79	1277.23	17000	50
Benzo(k)fluoranthene	22	4398.36	39000	46
Benzoic acid	6	76.33	170	41
Butyl benzyl phthalate	9	1431.22	6000	43
Chrysene	103	2471.44	35000	40
Di-n-butyl phthalate	5	1036.00	4600	130
Di-n-octyl phthalate	12	1165.50	11000	49
Dibenz(a,h)anthracene	31	845.87	10000	54
Dibenz(a,j)acridine	2	744.50	1400	89
Dibenzofuran	34	513.71	5500	46
Dimethyl phthalate	9	262.56	660	39
Fluoranthene	113	4081.84	53000	44
Fluorene	47	778.53	12000	55
Indeno(1,2,3-cd)pyrene	79	1228.06	19000	44
Isophorone	2	77.50	98	57
N-Nitrosodiphenylamine	2	100.00	150	50
Naphthalene	39	908.08	5900	50
Pentachlorophenol	1	55.00	55	55
Phenanthrene	93	3525.13	58000	42
Phenol	1	63.00	63	63
Pyrene	109	4057.69	55000	44
bis(2-Ethylhexyl)^phthalate	108	2566.92	23000	51

TABLE 5-6
MAXIMUM DETECTED CONCENTRATIONS AND ASSOCIATED SAMPLE LOCATIONS FOR ANALYTES DETECTED IN SEDIMENT SAMPLES

Compound Name	Result	Client Description	Date Collected	Foot-notes	Detection Limit	% Water
Inorganics (mg/kg)						
Aluminum	23400	SC-QW03-SD-201	01/17/95		25.5	61
Antimony	9.8	SC-QE07-SD-201	01/18/95		9.3	36
Barium	4700	SC-QW04-SD-403	07/10/95		1.3	20
Beryllium	1.9	SC-QW01-SD-103	11/03/94		0.23	12
Cadmium	415	SC-QE09-SD-401	07/11/95		0.63	21
Calcium	210000	SC-QE04-SD-401	07/12/95		47.5	16
Chromium	3210	SC-QW04-SD-402	07/10/95		1.4	28
Cobalt	126	SC-QW04-SD-402	07/10/95		1.4	28
Copper	2210	SC-QW06-SD-401	07/10/95		2.5	20
Iron	28500	SC-QW04-SD-403	07/10/95		12.6	20
Lead	4400	SC-QW06-SD-401	07/10/95		6.2	20
Magnesium	30600	SC-QE11-SD-401	07/11/95		23.9	16
Manganese	4250	SC-QW04-SD-402	07/10/95		1.4	28
Molybdenum	62.6	SC-QW03-SD-201	01/17/95		5.1	61
Nickel	3160	SC-QW03-SD-201	01/17/95		10.2	61
Potassium	4880	SC-QW01-SD-202	01/17/95		636	21
Silver	205	SC-QW03-SD-201	01/17/95		2.6	61
Sodium	1890	SC-QW04-SD-101	11/03/94		783	36
Vanadium	95.7	SC-QW03-SD-201	01/17/95		2.6	61
Zinc	1790	SC-QW03-SD-201	01/17/95		5.1	61
Arsenic	9	SC-QW06-SD-401	07/10/95		0.62	20
Mercury	0.9	SC-QW03-SD-201	01/17/95		0.26	61
Selenium	12	SC-QW03-SD-201	01/17/95		1.3	61
Thallium	0.38	SC-QE08-SD-101	11/01/94	J	1.3	61
Pesticides and PCBs (ug/kg)						
Aldrin	840	SC-QE07-SD-301	04/12/95		89	23
alpha-BHC	2	SC-QE11-SD-301	04/11/95	J	2.4	28
alpha-Chlordane	910	SC-QE11-SD-102	11/01/94		20	17
Aroclor 1254	40000	SC-QE02-SD-301	04/13/95		5600	42
delta-BHC	370	SC-QE07-SD-102	11/02/94		200	15
Endosulfan sulfate	41	SC-QE08-SD-301	04/12/95	M	15	57
Endrin	2	SC-QE01-SD-101	11/02/94	J	3.9	15
Heptachlor	52000	SC-QE07-SD-402	07/11/95		8100	16
Heptachlor epoxide	210	SC-QE08-SD-202	01/18/95		22	22
Methoxychlor	19	SC-QE01-SD-101	11/02/94	J	20	15
Volatile Organics (ug/kg)						
1,1,2,2-Tetrachloroethane	2.6	SC-QE03-SD-101	11/02/94	J	5.8	13
1,2,3-Trichloropropane	1.7	SC-QE01-SD-101	11/02/94	J	5.9	15
1,2-Dichloroethane	6.8	SC-QE09-SD-302	04/11/95		6.5	23
2-Butanone (MEK)	2900	SC-QE08-SD-301	04/12/95	B	2300	57
2-Hexanone	14	SC-QE08-SD-201	01/18/95	J	19	48
4-Methyl-2-pentanone ^(MIBK)	5	SC-QE08-SD-201	01/18/95	J	19	48
Acetone	950	SC-QE08-SD-301	04/12/95	J	2300	57

TABLE 5-6
MAXIMUM DETECTED CONCENTRATIONS AND ASSOCIATED SAMPLE LOCATIONS FOR ANALYTES DETECTED IN SEDIMENT SAMPLES

Compound Name	Result	Client Description	Date Collected	Foot-notes	Detection Limit	% Water
Acrolein	10	SC-QE11-SD-402	07/11/95	J	110	11
Acrylonitrile	4.5	SC-QE11-SD-101	11/01/94	J	120	15
Benzene	5.6	SC-QE02-SD-302	04/13/95	J	6.8	26
Carbon disulfide	21	SC-QE11-SD-103	11/01/94		6.0	16
Chlorobenzene	18000	SC-QE08-SD-301	04/12/95		1200	57
Chloroform	2.5	SC-QE07-SD-202	01/18/95	J	6.4	22
Chloromethane	3.3	SC-QW04-SD-202	01/16/95	J	15	34
Ethylbenzene	35	SC-QW04-SD-303	04/13/95	J	63	21
Methylene chloride	600	SC-QE08-SD-301	04/12/95	J	1200	57
Tetrachloroethene	17	SC-QE03-SD-301	04/13/95		6.1	19
Toluene	1100	SC-QE11-SD-301	04/11/95		70	28
trans-1,2-Dichloroethene	1.5	SC-QW06-SD-301	04/13/95	J	6.1	18
trans-1,4-Dichloro-^2-butene	1.2	SC-QE01-SD-101	11/02/94	J	5.9	15
Trichloroethene	77	SC-QW04-SD-102	11/03/94		6.8	26
Vinyl chloride	15	SC-QW04-SD-202	01/16/95		15	34
Xylenes (total)	84	SC-QW04-SD-303	04/13/95		63	21
Semivolatile Organics (ug/kg)						
1,2-Dichlorobenzene	2200	SC-QE07-SD-302	04/12/95		840	22
1,3-Dichlorobenzene	100	SC-QE07-SD-302	04/12/95	J	840	22
1,4-Dichlorobenzene	280	SC-QE07-SD-302	04/12/95	J	840	22
1-Chloronaphthalene	5200	SC-QE08-SD-102	11/01/94	J	7400	33
2,4-Dimethylphenol	350	SC-QW04-SD-402	07/10/95	J	1800	28
2-Chloronaphthalene	1400	SC-QE08-SD-401	07/11/95	J	6200	47
2-Methylnaphthalene	1200	SC-QE04-SD-401	07/12/95	J	3900	16
3/4-Methylphenol	220	SC-QW04-SD-402	07/10/95	J	1800	28
Acenaphthene	8000	SC-QE04-SD-401	07/12/95		3900	16
Acenaphthylene	44	SC-QW02-SD-401	07/10/95	J	390	16
Acetophenone	130	SC-QW04-SD-303	04/13/95	J	830	21
Anthracene	26000	SC-QE04-SD-401	07/12/95		3900	16
Benzidine	430	SC-QW03-SD-202	01/17/95	J	3100	20
Benzo(a)anthracene	39000	SC-QE04-SD-401	07/12/95		3900	16
Benzo(a)pyrene	26000	SC-QE04-SD-401	07/12/95		3900	16
Benzo(b)fluoranthene	28000	SC-QE06-SD-102	11/02/94		3800	14
Benzo(g,h,i)perylene	17000	SC-QE04-SD-401	07/12/95		3900	16
Benzo(k)fluoranthene	39000	SC-QE04-SD-401	07/12/95		3900	16
Benzoic acid	170	SC-QE03-SD-101	11/02/94	J	2900	13
bis(2-Ethylhexyl)^phthalate	23000	SC-QE02-SD-302	04/13/95		4500	26
Butyl benzyl phthalate	6000	SC-QE05-SD-101	11/02/94		760	13
Chrysene	35000	SC-QE04-SD-401	07/12/95		3900	16
Di-n-butyl phthalate	4600	SC-QE06-SD-402	07/12/95		4300	23
Di-n-octyl phthalate	11000	SC-QE02-SD-302	04/13/95		4500	26
Dibenz(a,h)anthracene	10000	SC-QE04-SD-401	07/12/95		3900	16
Dibenz(a,j)acridine	1400	SC-QE04-SD-401	07/12/95		--	16
Dibenzofuran	5500	SC-QE04-SD-401	07/12/95		3900	16

TABLE 5-6
MAXIMUM DETECTED CONCENTRATIONS AND ASSOCIATED SAMPLE LOCATIONS FOR ANALYTES DETECTED IN SEDIMENT SAMPLES

Compound Name	Result	Client Description	Date Collected	Foot-notes	Detection Limit	% Water
Dimethyl phthalate	660	SC-QE02-SD-401	07/12/95	J	4100	20
Fluoranthene	53000	SC-QE04-SD-401	07/12/95		3900	16
Fluorene	12000	SC-QE04-SD-401	07/12/95		3900	16
Indeno(1,2,3-cd)pyrene	19000	SC-QE04-SD-401	07/12/95		3900	16
Isophorone	98	SC-QE09-SD-301	04/11/95	J	500	34
N-Nitrosodiphenylamine	150	SC-QE07-SD-202	01/18/95	J	850	22
Naphthalene	5900	SC-QE04-SD-401	07/12/95		3900	16
Pentachlorophenol	55	SC-QW01-SD-201	01/17/95	J	2200	27
Phenanthrene	58000	SC-QE04-SD-401	07/12/95		3900	16
Phenol	63	SC-QW05-SD-201	01/16/95	J	400	17
Pyrene	55000	SC-QE06-SD-102	11/02/94		3800	14

Footnotes: B = Compound also is detected in blank. J = Results below the reporting limit or is an estimated concentration.
ND = Not Detected. M = Primary Result. 1 = Tenative ID. 2 = Confident ID. z = Name longer than data field allows.

TABLE 5-7
EXCEEDANCES OF BASELINE HEALTH RISK ASSESSMENT 10^{-6} SCREENING CRITERIA TO A DEPTH OF ONE FOOT

Sample Location	Sampling Interval (ft)	Analyte	1st Quarter Nov 1994 Detections (ug/kg)	2nd Quarter Jan 1995 Detections (ug/kg)	3rd Quarter April 1995 Detections (ug/kg)	4th Quarter July 1995 Detections (ug/kg)
QE01	0-0.5	Benzo(a)anthracene	2,900	1,600	2,000	ND
		Benzo(a)pyrene	2,200	1,100	2,200	ND
		Benzo(b)fluoranthene	6,100	2,600	4,000	ND
		Benzo(k)fluoranthene	ND	ND	ND	ND
		Chrysene	5,200	1,900	2,200	ND
QE02	0-0.5	Benzo(a)anthracene	1,100	750	11,000	6,800
		Benzo(a)pyrene	930	720	9,800	6,300
		Benzo(b)fluoranthene	2,100	1,600	ND	6,300
		Benzo(k)fluoranthene	ND	ND	15,000	5,500
		Chrysene	1,100	860	14,000	7,200
QE02	0.5-1.0	Benzo(a)anthracene	NS	NS	13,000	NS
		Benzo(a)pyrene	NS	NS	11,000	NS
		Benzo(b)fluoranthene	NS	NS	20,000	NS
		Benzo(k)fluoranthene	NS	NS	ND	NS
		Chrysene	NS	NS	15,000	NS
QE03	0-0.5	Benzo(a)anthracene	130	1,500	7,100	770
		Benzo(a)pyrene	210	1,300	5,600	750
		Benzo(b)fluoranthene	430	ND	11,000	1,400
		Benzo(k)fluoranthene	ND	2,800	ND	ND
		Chrysene	200	1,800	8,500	1,200
QE03	0.5-1.0	Benzo(a)anthracene	NS	NS	NS	3,200
		Benzo(a)pyrene	NS	NS	NS	2,800
		Benzo(b)fluoranthene	NS	NS	NS	3,400
		Benzo(k)fluoranthene	NS	NS	NS	2,600
		Chrysene	NS	NS	NS	3,900
QE04	0-0.5	Benzo(a)anthracene	42	NS	70	39,000
		Benzo(a)pyrene	ND	NS	61	26,000
		Benzo(b)fluoranthene	140	NS	150	ND
		Benzo(k)fluoranthene	ND	NS	ND	39,000
		Chrysene	93	NS	130	35,000
		Indeno(1,2,3-cd)pyrene	ND	NS	ND	19,000
QE05	0-0.5	Benzo(a)anthracene	81	680	710	3,600
		Benzo(a)pyrene	84	690	640	3,200
		Benzo(b)fluoranthene	180	1,600	1,400	3,100
		Benzo(k)fluoranthene	ND	ND	ND	3,400
		Chrysene	130	870	980	4,400
QE06	0-0.5	Benzo(a)anthracene	1,100	130	8,100	8,200
		Benzo(a)pyrene	920	100	7,400	8,800
		Benzo(b)fluoranthene	2,000	300	10,000	9,800
		Benzo(k)fluoranthene	ND	ND	4,700	9,300
		Chrysene	1,200	200	9,300	11,000

TABLE 5-7
EXCEEDANCES OF BASELINE HEALTH RISK ASSESSMENT 10^{-6} SCREENING CRITERIA TO A DEPTH OF ONE FOOT

Sample Location	Sampling Interval (ft)	Analyte	1st Quarter Nov 1994 Detections (ug/kg)	2nd Quarter Jan 1995 Detections (ug/kg)	3rd Quarter April 1995 Detections (ug/kg)	4th Quarter July 1995 Detections (ug/kg)
QE06	0.5-1.0	Benzo(a)anthracene	15,000	1,300	4,900	830
		Benzo(a)pyrene	14,000	1,200	6,000	1,200
		Benzo(b)fluoranthene	28,000	2,100	11,000	1,800
		Benzo(k)fluoranthene	ND	ND	ND	ND
		Chrysene	19,000	1,300	6,600	1,300
QE07	0-0.5	Benzo(a)anthracene	1,100	2,000	2,300	720
		Benzo(a)pyrene	830	2,200	2,200	670
		Benzo(b)fluoranthene	1,600	3,900	3,800	1,300
		Benzo(k)fluoranthene	ND	ND	ND	ND
		Chrysene	1,200	2,000	2,200	1,000
QE07	0.5-1.0	Benzo(a)anthracene	1,600	3,000	4,000	NS
		Benzo(a)pyrene	1,400	2,700	2,600	NS
		Benzo(b)fluoranthene	2,600	4,900	4,500	NS
		Benzo(k)fluoranthene	ND	ND	ND	NS
		Chrysene	1,800	3,300	3,300	NS
QE08	0-0.5	Benzo(a)anthracene	2,200	2,100	11,000	1,900
		Benzo(a)pyrene	2,200	1,800	7,700	1,700
		Benzo(b)fluoranthene	4,400	4,000	19,000	3,300
		Benzo(k)fluoranthene	ND	ND	ND	ND
		Chrysene	2,800	2,600	15,000	2,700
QE08	0.5-1.0	Benzo(a)anthracene	1,300	270	ND	990
		Benzo(a)pyrene	1,700	240	ND	ND
		Benzo(b)fluoranthene	3,500	520	350	1,600
		Benzo(k)fluoranthene	ND	ND	ND	ND
		Chrysene	2,100	350	280	1,600
QE10	0-0.5	Benzo(a)anthracene	ND	NS	ND	1,500
		Benzo(a)pyrene	ND	NS	ND	1,300
		Benzo(b)fluoranthene	ND	NS	ND	2,300
		Benzo(k)fluoranthene	ND	NS	ND	ND
		Chrysene	ND	NS	ND	2,100
QW02	0-0.5	Benzo(a)anthracene	560	600	360	1,900
		Benzo(a)pyrene	660	700	430	1,400
		Benzo(b)fluoranthene	760	1,400	810	2,700
		Benzo(k)fluoranthene	690	ND	ND	ND
		Chrysene	850	730	520	2,200
QW02	0.5-1.0	Benzo(a)anthracene	120	250	360	2,400
		Benzo(a)pyrene	130	300	440	3,100
		Benzo(b)fluoranthene	130	580	790	4,600
		Benzo(k)fluoranthene	130	ND	ND	2,200
		Chrysene	160	330	440	3,900

TABLE 5-7
EXCEEDANCES OF BASELINE HEALTH RISK ASSESSMENT 10^{-6} SCREENING CRITERIA TO A DEPTH OF ONE FOOT

Sample Location	Sampling Interval (ft)	Analyte	1st Quarter Nov 1994 Detections (ug/kg)	2nd Quarter Jan 1995 Detections (ug/kg)	3rd Quarter April 1995 Detections (ug/kg)	4th Quarter July 1995 Detections (ug/kg)
QW03	0-0.5	Benzo(a)anthracene	110	980	ND	440
		Benzo(a)pyrene	ND	1,600	1,100	470
		Benzo(b)fluoranthene	160	3,000	2,000	860
		Benzo(k)fluoranthene	ND	ND	ND	ND
		Chrysene	190	1,700	1,100	510
QW04	0-0.5	Benzo(a)anthracene	2,700	730	1,000	260
		Benzo(a)pyrene	2,600	1,100	1,300	300
		Benzo(b)fluoranthene	2,600	2,100	ND	650
		Benzo(k)fluoranthene	2,400	ND	2,400	ND
		Chrysene	3,000	1,200	1,200	390
QW04	05.-1.0	Benzo(a)anthracene	1,100	2,500	1,200	2,400
		Benzo(a)pyrene	1,500	3,100	1,300	3,200
		Benzo(b)fluoranthene	2,200	6,000	2,200	6,600
		Benzo(k)fluoranthene	ND	ND	ND	ND
		Chrysene	1,500	3,100	1,100	5,000
QW05	0-0.5	Benzo(a)anthracene	360	ND	3,500	ND
		Benzo(a)pyrene	430	ND	2,100	ND
		Benzo(b)fluoranthene	920	48	ND	65
		Benzo(k)fluoranthene	ND	ND	5,300	ND
		Chrysene	1,100	ND	3,700	51

Notes:

Shading indicates exceedance of 10-6 threshold limit. The 10-6 screening criteria is 1600 ug/kg for PAHs, except for Indeno(1,2,3-cd)pyrene the screening criteria is 12,000 ug/kg.

NS - No sample obtained during the quarter

ND - Non-detect

TABLE 5-8

EXCEEDANCES OF HUMAN HEALTH RISK ASSESSMENT 10^{-5} SCREENING CRITERIA

Sample Location	Sampling Interval (ft)	Analyte	1st Quarter Nov 1994 Detections (ug/kg)	2nd Quarter Jan 1995 Detections (ug/kg)	3rd Quarter April 1995 Detections (ug/kg)	4th Quarter July 1995 Detections (ug/kg)
QE02	0.5-1.0	Benzo(a)pyrene	NS	NS	11000	NS
QE04	0-0.5	Benzo(a)pyrene	ND	NS	61	26000
QE06	0.5-1.0	Benzo(a)pyrene	14000	1200	6000	1200
QE07	0-0.5	Heptachlor	120	1200	ND	52000

Notes:

NS - No sample obtained during the quarter

ND - Non-detect

Shading indicates exceedance of the following HHRA 10-5 screening criteria:

Heptachlor 17.156 ug/kg

Benzo(a)pyrene 10.575 ug/kg

TABLE 5-9

EXCEEDANCES OF HUMAN HEALTH RISK ASSESSMENT 10^{-6} SCREENING CRITERIA

Sample Location	Sampling Interval (ft)	Analyte	1st Quarter Nov 1994 Detections (ug/kg)	2nd Quarter Jan 1995 Detections (ug/kg)	3rd Quarter April 1995 Detections (ug/kg)	4th Quarter July 1995 Detections (ug/kg)
QE01	0-0.5	Benzo(a)pyrene	2200	1100	2200	ND
QE02	0-0.5	Benzo(a)anthracene	1100	750	11000	6800
		Benzo(a)pyrene	930	720	9800	6300
		Dibenz(a,h)anthracene	ND	ND	1500	1600
QE02	0.5-1.0	Benzo(a)anthracene	NS	NS	13000	NS
		Benzo(a)pyrene	NS	NS	11000	NS
		Benzo(b)fluoranthene	NS	NS	20000	NS
		Dibenz(a,h)anthracene	NS	NS	1300	NS
QE03	0-0.5	Benzo(a)pyrene	210	1300	5600	750
		Benzo(b)fluoranthene	430	ND	11000	1400
QE03	0.5-1.0	Benzo(a)pyrene	NS	NS	NS	2800
QE04	0-0.5	Benzo(a)pyrene	ND	NS	61	26000
		Benzo(a)anthracene	42	NS	70	39000
		Dibenz(a,h)anthracene	ND	NS	ND	10000
		Indeno(1,2,3-cd)pyrene	ND	NS	ND	19000
QE05	0-0.5	Benzo(a)pyrene	84	690	640	3200
QE06	0-0.5	Benzo(a)pyrene	920	100	7400	8800
		Dibenz(a,h)anthracene	ND	ND	1100	2200
QE06	0.5-1.0	Benzo(a)anthracene	15000	1300	4900	830
		Benzo(a)pyrene	14000	1200	6000	1200
		Benzo(b)fluoranthene	28000	2100	11000	1800
QE06	> 1	Benzo(a)pyrene	3100	850	NS	920
QE07	0-0.5	Aldrin	57	ND	840	ND
		Benzo(a)pyrene	830	2200	2200	670
		Heptachlor	120	1200	ND	52000
QE07	0.5-1.0	Aldrin	ND	ND	650	NS
		Benzo(a)pyrene	1400	2700	2600	NS
QE07	> 1	Benzo(a)pyrene	2600	NS	270	NS
QE08	0-0.5	Benzo(a)anthracene	2200	2100	11000	1900
		Benzo(a)pyrene	2200	1800	7700	1700
		Benzo(b)fluoranthene	4400	4000	19000	3300
		Dibenz(a,h)anthracene	54	ND	1600	ND
QE08	0.5-1.0	Benzo(a)pyrene	1700	240	ND	ND
QE09	> 1	Heptachlor	ND	36	ND	3100
QE10	0-0.5	Benzo(a)pyrene	ND	NS	ND	1300
QW02	0-0.5	Benzo(a)pyrene	660	700	430	1400
QW02	0.5-1.0	Benzo(a)pyrene	130	300	440	3100

TABLE 5-9

EXCEEDANCES OF HUMAN HEALTH RISK ASSESSMENT 10^{-6} SCREENING CRITERIA

Sample Location	Sampling Interval (ft)	Analyte	1st Quarter Nov 1994 Detections (ug/kg)	2nd Quarter Jan 1995 Detections (ug/kg)	3rd Quarter April 1995 Detections (ug/kg)	4th Quarter July 1995 Detections (ug/kg)
QW03	0-0.5	Benzo(a)pyrene	ND	1600	1100	470
QW03	0.5-1.0	Benzidine	NS	430	ND	ND
QW04	0-0.5	Benzo(a)pyrene	2600	1100	1300	300
QW04	0.5-1.0	Benzo(a)pyrene	1500	3100	1300	3200
QW04	> 1	Benzo(a)pyrene			3100	
QW05	0-0.5	Benzo(a)pyrene			2100	

Notes:

NS - No sample obtained during the quarter

ND - Non-detect

Shading indicates exceedance of the following HHRA 10-6 screening criteria:

Aldrin 454 ug/kg

Heptachlor 1715 ug/kg

Benzidine 420 ug/kg

Benzo(a)anthracene 10575 ug/kg

Benzo(a)pyrene 1,057 ug/kg

Dibenz(a,h)anthracene 1,0575 ug/kg

Indeno(1,2,3-cd)pyrene 10,575 ug/kg

TABLE 5-10
COMPARISON OF QUARTERLY MONITORING MAXIMUM ANALYTE CONCENTRATIONS WITH RI RESULTS IN SEDIMENT

Analytes	Phase I RI	Phase II RI	First Quarter (Nov 1994)		Second Quarter (Jan 1995)		Third Quarter (Apr 1995)		Fourth Quarter (Jul 1995)	
			0-6 in	6-12 in	0-6 in	6-12 in	0-6 in	6-12 in	0-6 in	6-12 in
Metals (mg/kg)										
Aluminum	42300		14100	16400	23400	20000	21000	16400	13400	12900
Antimony					9.8	6.2	7.9	9.5	8.6	
Arsenic	15.7		7.5	7.5	7.2	5.3	8.4	7.2	9	5.7
Barium	2910		3850	1010	2380	1350	1860	12000	1690	1050
Beryllium			1.1	1.3	1.2	1.2	1.5	1.2	0.85	0.82
Boron										
Cadmium	428	15.7	123	328	83.2	132	106	183	415	108
Calcium	72500		181000	132000	128000	36000	142000	81200	210000	174000
Chromium	2020	186	820	13350	1230	2430	1890	828	2040	3210
Cobalt	52.1		42.1	35.7	123	91.8	61.7	56.7	21.6	126
Copper	600		541	168	650	125	583	246	2210	175
Iron	41200		19000	26600	249000	19800	21100	21800	24900	22200
Lead	586	152	318	184	225	469	268	286	4400	746
Magnesium	20400		22800	15200	16700	12000	13600	10300	306000	17000
Manganese	1490		890	965	836	1750	778	2030	1930	4250
Mercury	2.6		0.55	0.3	.9	.3	.59	.81	0.63	0.58
Molybdenum			23.8	26	62.6	34.8	36.9	56.4	25.5	17.9
Nickel	2270		704	1090	3160	1370	2830	1220	747	861
Potassium	2300		2030	2910	4230	4880	3200	2850	1930	1590
Selenium	10.2		3.4	4.2	12	2	4.3	.79	1	0.85
Silver	112		64.6	79.4	205	72.2	91.9	6.9	18.7	15.9
Sodium			1890	819					191	165
Thallium			0.38	0.19			.2		0.14	0.18
Tin										
Vanadium	52.9		48.7	58.7	95.7	42.1	67.9	38.4	48.3	47
Zinc	640		668	372	1790	506	1280	311	890	542
PCB's and Chlorinated Pesticides (ug/kg)										
4,4'-DDD										
4,4'-DDE										
4,4'-DDT										
Aldrin			57	120		1.4	840	650		
alpha-BHC							2			

TABLE 5-10
COMPARISON OF QUARTERLY MONITORING MAXIMUM ANALYTE CONCENTRATIONS WITH RI RESULTS IN SEDIMENT

Analytes	Phase I RI	Phase II RI	First Quarter (Nov 1994)		Second Quarter (Jan 1995)		Third Quarter (Apr 1995)		Fourth Quarter (Jul 1995)	
			0-6 in	6-12 in	0-6 in	6-12 in	0-6 in	6-12 in	0-6 in	6-12 in
alpha-Chlordane				910						
Aroclor 1016										
Aroclor 1221										
Aroclor 1232										
Aroclor 1242										
Aroclor 1248										
Aroclor 1254			8300	5200	24000	33000	40000	18000	25000	17000
Aroclor 1260										
beta-BHC										
delta-BHC			140	370						
Dieldrin										
Endosulfan I										
Endosulfan II										
Endosulfan sulfate							41			
Endrin			2							
gamma-BHC (Lindane)										
gamma-Chlordane										
Heptachlor			180	820	1200	1400		110	52000	49
Heptachlor epoxide						210				
Methoxychlor			19							
Toxaphene										
Volatile Organics (ug/kg)										
Acetone	1700	51	100	62	100	130	950	240	490	82
Acrolein										10
Acrylonitrile			4.5							
Benzene		1		2.2		1.5	1.7	5.6		
Bromodichloromethane										
Bromoform										
Bromomethane										
2-Butanone (MEK)			6.9	12	21	26	2900	51	80	15
Carbon disulfide	36	2	11	15	5.6	2.9	1.5	11	8.7	9.6
Carbon tetrachloride										
Chlorobenzene	78000	10	41	940	310	3900	18000	64	120	64
Chloroethane	86									
Chloroform	9200	2				2.5				

TABLE 5-10
COMPARISON OF QUARTERLY MONITORING MAXIMUM ANALYTE CONCENTRATIONS WITH RI RESULTS IN SEDIMENT

Analytes	Phase I RI	Phase II RI	First Quarter (Nov 1994)		Second Quarter (Jan 1995)		Third Quarter (Apr 1995)		Fourth Quarter (Jul 1995)	
			0-6 in	6-12 in	0-6 in	6-12 in	0-6 in	6-12 in	0-6 in	6-12 in
Chloromethane			1.8			3.3				
Dibromochloromethane										
Dibromomethane										
trans-1,4-Dichloro-2-butene										
Dichlorodifluoromethane										
1,1-Dichloroethane										
1,2-Dichloroethane							2.1	6.8		
1,1-Dichloroethene										
1,2-Dichloropropane										
cis-1,3-Dichloropropene										
trans-1,3-Dichloropropene										
Ethylbenzene	4		3.3	2.3				2.5		
Ethyl methacrylate										
Iodomethane										
2-Hexanone					14					
Methylene chloride	140000	51	24	14	5.4	390	600	15	7.1	7.2
4-Methyl-2-pentanone (MIBK)					5					
Styrene										
1,1,1,2-Tetrachloroethane			2.6							
1,1,2,2-Tetrachloroethane										
Tetrachloroethene	83000	11	7.9	16	5.5		17	5.8	3.6	
Toluene	980	6	12	3.6		2.9	2.1	150	3	2.7
1,1,1-Trichloroethane										
1,1,2-Trichloroethane										
Trichlorethene	4100		16	77	4.1	1.7	1.9	1.9		
Trichlorofluoromethane										
1,2,3-Trichloropropane			1.7							
Vinyl acetate	9									
Vinyl chloride						15				
Xylenes (total)	1000	6		3.4	2.3			1.7		
trans-1,2-Dichloroethene							1.5			
Ethanol										
2-Chlorethyl vinyl ether										

TABLE 5-10
COMPARISON OF QUARTERLY MONITORING MAXIMUM ANALYTE CONCENTRATIONS WITH RI RESULTS IN SEDIMENT

Analytes	Phase I RI	Phase II RI	First Quarter (Nov 1994)		Second Quarter (Jan 1995)		Third Quarter (Apr 1995)		Fourth Quarter (Jul 1995)	
			0-6 in	6-12 in	0-6 in	6-12 in	0-6 in	6-12 in	0-6 in	6-12 in
Semivolatile Organics (ug/kg)										
Acenaphthene	1100		410	3100	260	490	1600	1800	8000	510
Acenaphthylene									44	
Acetophenone										
4-Aminobiphenyl										
Aniline										
Anthracene	1500		830	4800	620	1400	5800	4400	26000	840
Benzo(a)anthracene	4800		2900	15000	2100	3000	11000	13000	39000	3200
Benzo(b)fluoranthene	9200		6100	28000	4000	6000	19000	20000	9800	6600
Benzo(k)fluoranthene	5300		2400	670	2800	110	15000	81	39000	2600
Benzo(g,h,i)perylene	4100		1800	1200	1300	1700	7600	6800	17000	1900
Benzo(a)pyrene	4400		2600	14000	2200	3100	9800	11000	26000	3200
Benzyl alcohol										
4-Bromophenyl phenyl ether										
Butyl benzyl phthalate	720		6000				4900		560	
4-Chloroaniline										
bis(2-Chloroethoxy)methane										
bis(2-Chloroethyl)ether										
bis(2-Chloroisopropyl)ether										
4-Chloro-3-methylphenol										
2-Chloronaphthalene	1600			700		210		350	1400	1000
2-Chlorophenol										
4-Chlorophenyl phenyl ether										
Chrysene	7100		5200	19000	2600	3300	15000	15000	35000	5000
Dibenz(a,h,)anthracene	110		750	420	150		1600	1300		
Dibenzofuran	480		250	1500	160	340	1000	1000	5500	310
Di-n-butyl phthalate	2200		150	150	130	150				4600
1,2-Dichlorobenzene	3100		340	200	250	570	850	2200	310	
1,3-Dichlorobenzene	280							100		
1,4-Dichlorobenzene	4400		60			210		280		46
3,3'-Dichlorobenzidine	1700									
2,4-Dichlorophenol	160									
2,6-Dichlorophenol										
Diethyl phthalate										
p-Dimethylaminoazobenzene										

TABLE 5-10
COMPARISON OF QUARTERLY MONITORING MAXIMUM ANALYTE CONCENTRATIONS WITH RI RESULTS IN SEDIMENT

Analytes	Phase I RI	Phase II RI	First Quarter (Nov 1994)		Second Quarter (Jan 1995)		Third Quarter (Apr 1995)		Fourth Quarter (Jul 1995)	
			0-6 in	6-12 in	0-6 in	6-12 in	0-6 in	6-12 in	0-6 in	6-12 in
7,12-Dimethylbenz(a)-anthracene										
a,a-Dimethylphenethyl-amine										
2,4-Dimethylphenol			84		50					350
Dimethyl phthalate					57				660	530
4,6-Dinitro-2-methylphenol										
2,4-Dinitrophenol										
2,4-Dinitrotoluene										
2,6-Dinitrotoluene										
Di-n-octyl phthalate	540		410	400		520	180	11000	700	
Diphenylamine										
bis(2-Ethylhexyl)phthalate	46000		7000	7800	8000	11000	7800	23000		
Ethyl methanesulfonate										
Fluoranthene	11000		6400	3800	6300	8100	25000	23000	53000	8000
Fluorene	880		410	2600	300	560	2400	2200	12000	530
Hexachlorobenzene										
Hexachlorobutadiene										
Hexachlorocyclopentadiene										
Hexachloroethane										
Indeno(1,2,3-cd)pyrene	3800		1700	4600	1100	1600	6100	5600	19000	1700
Isophorone							98			57
3-Methylcholanthrene										
Methyl methanesulfonate										
2-Methylnaphthalene	1900		110	150		100	410	1000	1200	100
2-Methylphenol	68									
3/4-Methylphenol			88			58	140		160	220
Naphthalene	690		1000	860	1100	3700	980	1600	5900	800
1-Naphthylamine										
2-Naphthylamine										
3-Nitroaniline										
4-Nitroaniline										
Nitrobenzene										
2-Nitrophenol										
4-Nitrophenol										
N-Nitroso-di-n-butylamine										
N-Nitrosodiphenylamine						150	50			
N-Nitroso-di-n-propylamine										

TABLE 5-10
COMPARISON OF QUARTERLY MONITORING MAXIMUM ANALYTE CONCENTRATIONS WITH RI RESULTS IN SEDIMENT

Analytes	Phase I RI	Phase II RI	First Quarter (Nov 1994)		Second Quarter (Jan 1995)		Third Quarter (Apr 1995)		Fourth Quarter (Jul 1995)	
			0-6 in	6-12 in	0-6 in	6-12 in	0-6 in	6-12 in	0-6 in	6-12 in
N-Nitrosopiperidine										
Pentachlorobenzene										
Pentachloronitrobenzene										
Pentachlorophenol					55					
Phenacetin										
Phenanthrene	6700		3800	3700	3300	6200	22000	14000	58000	5200
Phenol					63					
2-Picoline										
Pronamide										
Pyrene	10000		7800	55000	4500	6400	26000	33000	51000	7100
1,2,4,5-Tetrachloro-benzene										
2,3,4,6-Tetrachlorophenol										
1,2,4-Trichlorobenzene										
2,4,5-Trichlorophenol										
2,4,6-Trichlorophenol										
Benzidine				160			430			
1-Chloronaphthalene			250	5200	610	2400		3500	1300	960
Dibenz(a,j)acridine									1400	89
Azobenzene										
Benzoic acid			170				70			

TABLE 5-11
STATISTICAL EVALUATION OF ANALYTES DETECTED
IN SURFACE WATER SAMPLES

Compound Name	Frequency of Detection	Average Result	Maximum Result	Minimum Result
Inorganics (mg/L)				
Aluminum	40	0.2745	4.3	0.025
Barium	59	0.3663	0.68	0.13
Cadmium	2	0.0049	0.0061	0.0036
Calcium	59	52.2475	99.6	23.7
Chromium	30	0.0435	0.52	0.0058
Cobalt	5	0.0113	0.031	0.004
Copper	59	0.0419	0.3	0.0032
Iron	58	0.3106	3.4	0.037
Magnesium	59	22.6356	45.7	3.1
Manganese	59	0.0681	0.44	0.0042
Molybdenum	42	0.1395	0.57	0.014
Nickel	17	0.0461	0.33	0.0095
Potassium	58	2.8638	5.7	0.94
Sodium	58	42.9759	203	2.9
Vanadium	48	0.0137	0.03	0.0053
Zinc	59	0.0239	0.068	0.005
Arsenic	34	0.0018	0.0035	0.001
Lead	25	0.0040	0.03	0.001
Mercury	1	0.0002	0.00018	0.00018
Selenium	5	0.0034	0.0041	0.0024
Thallium	2	0.0012	0.0012	0.0011
Pesticides and PCBs (ug/L)				
Aldrin	2	0.06	0.086	0.032
Volatile Organics (ug/L)				
2-Butanone (MEK)	2	2.25	2.8	1.7
Acetone	18	7.73	12	4.6
Bromoform	9	1.82	2.6	1.3
Carbon disulfide	1	1.00	1	1
Chlorobenzene	1	1.80	1.8	1.8
Chloroform	2	1.60	1.8	1.4
Methylene chloride	40	8.46	150	1
Tetrachloroethene	6	4.45	11	1.2
Toluene	3	1.40	1.7	1.1
Trichloroethene	4	5.03	14	1.4
Vinyl chloride	1	1.00	1	1
Semivolatile Organics (ug/L)				
3/4-Methylphenol	2	1.50	1.7	1.3
4-Nitrophenol	5	1.54	2	1.2
Benzoic acid	5	2.60	3.9	1.3
Benzyl alcohol	3	1.30	1.7	1
Diethyl phthalate	1	1.20	1.2	1.2
Fluoranthene	2	1.35	1.5	1.2
N-Nitroso-di-^n-propylamine	1	1.80	1.8	1.8
Phenanthrene	1	1.60	1.6	1.6
Phenol	9	1.74	3.5	1
bis(2-Ethylhexyl)^phthalate	9	2.27	4.6	0.94

TABLE 5-12
MAXIMUM DETECTED CONCENTRATIONS AND ASSOCIATED SAMPLE LOCATIONS FOR ANALYTES DETECTED IN SURFACE WATER SAMPLES

Compound Name	Result	Client Description	Date Collected	Footnotes	Detection Limit
Inorganics (mg/L)					
Aluminum	4.3	SC-QW04-SW-101	11/04/94		0.10
Barium	0.68	SC-QE02-SW-401	07/12/95		0.010
Cadmium	0.0061	SC-QE09-SW-201	01/18/95		0.0050
Calcium	99.6	SC-QE02-SW-401	07/12/95		0.20
Chromium	0.52	SC-QE09-SW-201	01/18/95		0.010
Cobalt	0.031	SC-QW03-SW-101	11/03/94		0.010
Copper	0.3	SC-QE02-SW-401	07/12/95		0.020
Iron	3.4	SC-QW04-SW-101	11/04/94		0.10
Magnesium	45.7	SC-QE02-SW-401	07/12/95		0.20
Manganese	0.44	SC-QW04-SW-301	04/13/95		0.010
Molybdenum	0.57	SC-QE03-SW-101	11/02/94		0.020
Nickel	0.33	SC-QW03-SW-101	11/03/94		0.040
Potassium	5.7	SC-QE02-SW-401	07/12/95		5.0
Potassium	5.7	SC-QE10-SW-101	11/01/94		5.0
Sodium	203	SC-QE10-SW-101	11/01/94		5.0
Vanadium	0.03	SC-QE02-SW-401	07/12/95		0.010
Zinc	0.068	SC-QW04-SW-101	11/04/94		0.020
Arsenic	0.0035	SC-QW04-SW-201	01/16/95	J	0.0050
Lead	0.03	SC-QE04-SW-201	01/19/95		0.010
Mercury	0.00018	SC-QE09-SW-201	01/18/95	J	0.00020
Selenium	0.0041	SC-QE02-SW-201	01/19/95	J	0.010
Selenium	0.0041	SC-QE11-SW-301	04/11/95	J	0.0050
Thallium	0.0012	SC-QE11-SW-301	04/11/95	J	0.010
Pesticides and PCBs (ug/L)					
Aldrin	0.086	SC-QE10-SW-201	01/17/95		0.050
Volatile Organics (ug/L)					
2-Butanone (MEK)	2.8	SC-QE06-SW-101	11/02/94	J	10
Acetone	12	SC-QE02-SW-401	07/12/95		10
Bromoform	2.6	SC-QE03-SW-301	04/13/95	J	5.0
Carbon disulfide	1	SC-QW05-SW-201	01/16/95	J	5.0
Chlorobenzene	1.8	SC-QW04-SW-201	01/16/95	J	5.0
Chloroform	1.8	SC-QE02-SW-201	01/19/95	J	5.0
Methylene chloride	150	SC-QE09-SW-201	01/18/95		5.0
Tetrachloroethene	11	SC-QW04-SW-101	11/04/94		5.0
Toluene	1.7	SC-QW02-SW-301	04/14/95	J	5.0
Trichloroethene	14	SC-QW04-SW-201	01/16/95		5.0
Vinyl chloride	1	SC-QW04-SW-201	01/16/95	J	10
Semivolatile Organics (ug/L)					
3/4-Methylphenol	1.7	SC-QW02-SW-301	04/14/95	J	10
4-Nitrophenol	2	SC-QE08-SW-201	01/18/95	J	50
Benzoic acid	3.9	SC-QE02-SW-401	07/12/95	J	50
Benzyl alcohol	1.7	SC-QE06-SW-201	01/18/95	J	10
bis(2-Ethylhexyl)^phthalate	4.6	SC-QE05-SW-401	07/12/95	J	10
Diethyl phthalate	1.2	SC-QE02-SW-401	07/12/95	J	10
Fluoranthene	1.5	SC-QE07-SW-201	01/18/95	J	10
N-Nitroso-di-^n-propylamine	1.8	SC-QW04-SW-101	11/04/94	J	10
Phenanthrene	1.6	SC-QE07-SW-201	01/18/95	J	10
Phenol	3.5	SC-QE06-SW-201	01/18/95	J	10

Footnotes: B = Compound also is detected in blank. J = Results below the reporting limit or is an estimated concentration.
ND = Not Detected. M = Primary Result. 1 = Tenative ID. 2 = Confident ID. z = Name longer than data field allows.

TABLE 5-13
COMPARISON OF QUARTERLY MONITORING MAXIMUM ANALYTE CONCENTRATIONS WITH RI RESULTS IN SURFACE WATER

Analytes	Phase I RI	Phase II RI	First Quarter (Nov 1994)	Second Quarter (Jan 1995)	Third Quarter (Apr 1995)	Fourth Quarter (Jul 1995)
Metals (mg/L)						
Aluminum	7.43		4.3	0.55	0.7	0.15
Antimony						
Arsenic	0.0098		0.0026	0.0035	0.0024	0.0031
Barium	1.9		0.61	0.46	0.44	0.68
Beryllium	0.001					
Boron						
Cadmium	0.0569	0.0094	0.0036	0.0061		
Calcium	117		92.4	74.4	61.2	99.6
Chromium	0.628	0.0369	0.039	0.52	0.031	0.056
Cobalt	0.324		0.031	0.0068	0.008	
Copper	0.985		0.11	0.08	0.098	0.3
Iron	4.55		3.4	1.3	1.4	0.28
Lead	0.325	0.0345	0.0066	0.03	0.0054	0.0048
Magnesium	40.8		44.3	33.3	29.9	45.7
Manganese	3.06		0.35	0.13	0.44	0.14
Mercury				0.00018		
Molybdenum			0.57	0.42	0.2	0.3
Nickel	3.56		0.33	0.093	0.033	0.016
Potassium	6.68		5.7	5	4.5	5.7
Selenium	0.0209		0.0036	0.0041	0.0041	0.0024
Silver	0.0131					
Sodium	130		203	106	123	111
Thallium					0.0012	
Tin						
Vanadium	0.067		0.028	0.018	0.017	0.03
Zinc	2.4		0.068	0.044	0.034	0.032
PCB's and Chlorinated Pesticides (ug/L)						
4,4'-DDD						
4,4'-DDE						
4,4'-DDT						
Aldrin				0.086		
alpha-BHC						
alpha-Chlordane						
Aroclor 1016						
Aroclor 1221						
Aroclor 1232						
Aroclor 1242						
Aroclor 1248						
Aroclor 1254						
Aroclor 1260						
beta-BHC						
delta-BHC						

TABLE 5-13
COMPARISON OF QUARTERLY MONITORING MAXIMUM ANALYTE CONCENTRATIONS WITH RI RESULTS IN SURFACE WATER

Analytes	Phase I RI	Phase II RI	First Quarter (Nov 1994)	Second Quarter (Jan 1995)	Third Quarter (Apr 1995)	Fourth Quarter (Jul 1995)
Dieldrin						
Endosulfan I						
Endosulfan II						
Endosulfan sulfate						
Endrin						
gamma-BHC (Lindane)						
gamma-Chlordane						
Heptachlor						
Heptachlor epoxide						
Methoxychlor						
Toxaphene						
Volatile Organics (ug/L)						
Acetone	5	60	11	4.6	8.4	12
Acrolein						
Acrylonitrile						
Benzene		2				
Bromodichloromethane	6	0.9				
Bromoform	4	15	1.9		2.6	1.8
Bromomethane						
2-Butanone (MEK)			2.8			
Carbon disulfide		1		1		
Carbon tetrachloride						
Chlorobenzene		2		1.8		
Chloroethane						
Chloroform	6	9		1.8		
Chloromethane						
Dibromochloromethane	5					
Dibromomethane						
trans-1,4-Dichloro-2-butene						
Dichlorodifluoromethane						
1,1-Dichloroethane						
1,2-Dichloroethane						
1,1-Dichloroethene						
1,2-Dichloropropane						
cis-1,3-Dichloropropene						
trans-1,3-Dichloropropene						
Ethylbenzene						
Ethyl methacrylate						
Iodomethane						
2-Hexanone						
Methylene chloride	14	620	11	150	2.8	5.1
4-Methyl-2-pentanone (MIBK)						
Styrene						
1,1,1,2-Tetrachloroethane						

TABLE 5-13
COMPARISON OF QUARTERLY MONITORING MAXIMUM ANALYTE CONCENTRATIONS WITH RI RESULTS IN SURFACE WATER

Analytes	Phase I RI	Phase II RI	First Quarter (Nov 1994)	Second Quarter (Jan 1995)	Third Quarter (Apr 1995)	Fourth Quarter (Jul 1995)
1,1,2,2-Tetrachloroethane						
Tetrachloroethene	3	6	11	7.6	2.1	
Toluene	1	5		1.4		
1,1,1-Trichloroethane	2	5				
1,1,2-Trichloroethane		2				
Trichlorethene			3.1	14	1.6	
Trichlorofluoromethane						
1,2,3-Trichloropropane						
Vinyl acetate						
Vinyl chloride					1	
Xylenes (total)		2				
trans-1,2-Dichloroethene						
Ethanol						
2-Chlorethyl vinyl ether						
Semivolatile Organics (ug/L)						
Acenaphthene						
Acenaphthylene						
Acetophenone						
4-Aminobiphenyl						
Aniline						
Anthracene						
Benzo(a)anthracene						
Benzo(b)fluoranthene						
Benzo(k)fluoranthene						
Benzo(g,h,i)perylene	6					
Benzo(a)pyrene						
Benzyl alcohol				1.7	1.2	
4-Bromophenyl phenyl ether						
Butyl benzyl phthalate			1			
4-Chloroaniline						
bis(2-Chloroethoxy)methane						
bis(2-Chloroethyl)ether						
bis(2-Chloroisopropyl)ether						
4-Chloro-3-methylphenol						
2-Chloronaphthalene						
2-Chlorophenol						
4-Chlorophenyl phenyl ether						
Chrysene	5					
Dibenz(a,h,)anthracene						
Dibenzofuran						
Di-n-butyl phthalate						
1,2-Dichlorobenzene						
1,3-Dichlorobenzene						
1,4-Dichlorobenzene						

TABLE 5-13
COMPARISON OF QUARTERLY MONITORING MAXIMUM ANALYTE CONCENTRATIONS WITH RI RESULTS IN SURFACE WATER

Analytes	Phase I RI	Phase II RI	First Quarter (Nov 1994)	Second Quarter (Jan 1995)	Third Quarter (Apr 1995)	Fourth Quarter (Jul 1995)
3,3'-Dichlorobenzidine						
2,4-Dichlorophenol						
2,6-Dichlorophenol						
Diethyl phthalate						1.2
p-Dimethylaminoazobenzene						
7,12-Dimethylbenz(a)-anthracene						
a,a-Dimethylphenethyl-amine						
2,4-Dimethylphenol						
Dimethyl phthalate						
4,6-Dinitro-2-methylphenol						
2,4-Dinitrophenol						
2,4-Dinitrotoluene						
2,6-Dinitrotoluene						
Di-n-octyl phthalate						
Diphenylamine						
bis(2-Ethylhexyl)phthalate			1	3.6		
Ethyl methanesulfonate						
Fluoranthene	1			1.5		
Fluorene						
Hexachlorobenzene						
Hexachlorobutadiene						
Hexachlorocyclopentadiene						
Hexachloroethane						
Indeno(1,2,3-cd)pyrene						
Isophorone						
3-Methylcholanthrene						
Methyl methanesulfonate						
2-Methylnaphthalene						
2-Methylphenol						
3/4-Methylphenol					1.3	1.7
Naphthalene						
1-Naphthylamine						
2-Naphthylamine						
3-Nitroaniline						
4-Nitroaniline						
Nitrobenzene						
2-Nitrophenol						
4-Nitrophenol				1.7	2	1.2
N-Nitroso-di-n-butylamine						
N-Nitrosodiphenylamine						
N-Nitroso-di-n-propylamine						
N-Nitrosopiperidine						
Pentachlorobenzene						
Pentachloronitrobenzene						
Pentachlorophenol						

TABLE 5-13
COMPARISON OF QUARTERLY MONITORING MAXIMUM ANALYTE CONCENTRATIONS WITH RI RESULTS IN SURFACE WATER

Analytes	Phase I RI	Phase II RI	First Quarter (Nov 1994)	Second Quarter (Jan 1995)	Third Quarter (Apr 1995)	Fourth Quarter (Jul 1995)
Phenacetin						
Phenanthrene				1.6		
Phenol				3.5	2.7	
2-Picoline						
Pronamide						
Pyrene	1					
1,2,4,5-Tetrachloro-benzene						
2,3,4,6-Tetrachlorophenol						
1,2,4-Trichlorobenzene						
2,4,5-Trichlorophenol						
2,4,6-Trichlorophenol						
Benzidine						
1-Chloronaphthalene						
Dibenz(a,j)acridine						
Azobenzene						
Benzoic acid	0.4				2.9	3.9

6.0
REVIEW OF GROUNDWATER

The RI investigated groundwater and surface water/groundwater interaction of the Soldier Creek Off-Base Groundwater Operable Unit of the Building 3001/Soldier Creek NPL site. Field work for the investigation was conducted from May 1994 through June 1995. The following discussion summarizes findings of the RI performed by PES (1995).

6.1 GROUNDWATER/SURFACE WATER INTERACTION

Measurements of stream discharge, vertical hydraulic conductivity, and hydrogeologic data were used to determine how East and West Soldier Creeks interact with the near-surface and underlying aquifer zones. Seasonal baseflow into and out of East and West Soldier Creeks, along gaining and losing segments of the creek, was also estimated. To determine the hydraulic interaction between East and West Soldier Creeks and the underlying groundwater flow system, stream discharge was determined at eight gauging stations, six streambed piezometer clusters consisting of three piezometers were installed and six measurements of streambed permeability were completed (PES, 1995).

To examine gains or losses, East and West Soldier Creeks were broken up into segments. Relative gains or losses for each segment of the two creeks were based on low flow data. West Soldier Creek is a gaining stream from September through March. During the months of April through August, West Soldier Creek is a losing stream. East Soldier Creek is generally a losing stream from its headwaters at SE 44th Street to I-40.

Results of the streambed piezometric measurements indicated that East Soldier Creek, just upstream of the confluence with Tributary B, fluctuated from losing to gaining stream between January and April. West Soldier Creek remained a gaining stream from January to April.

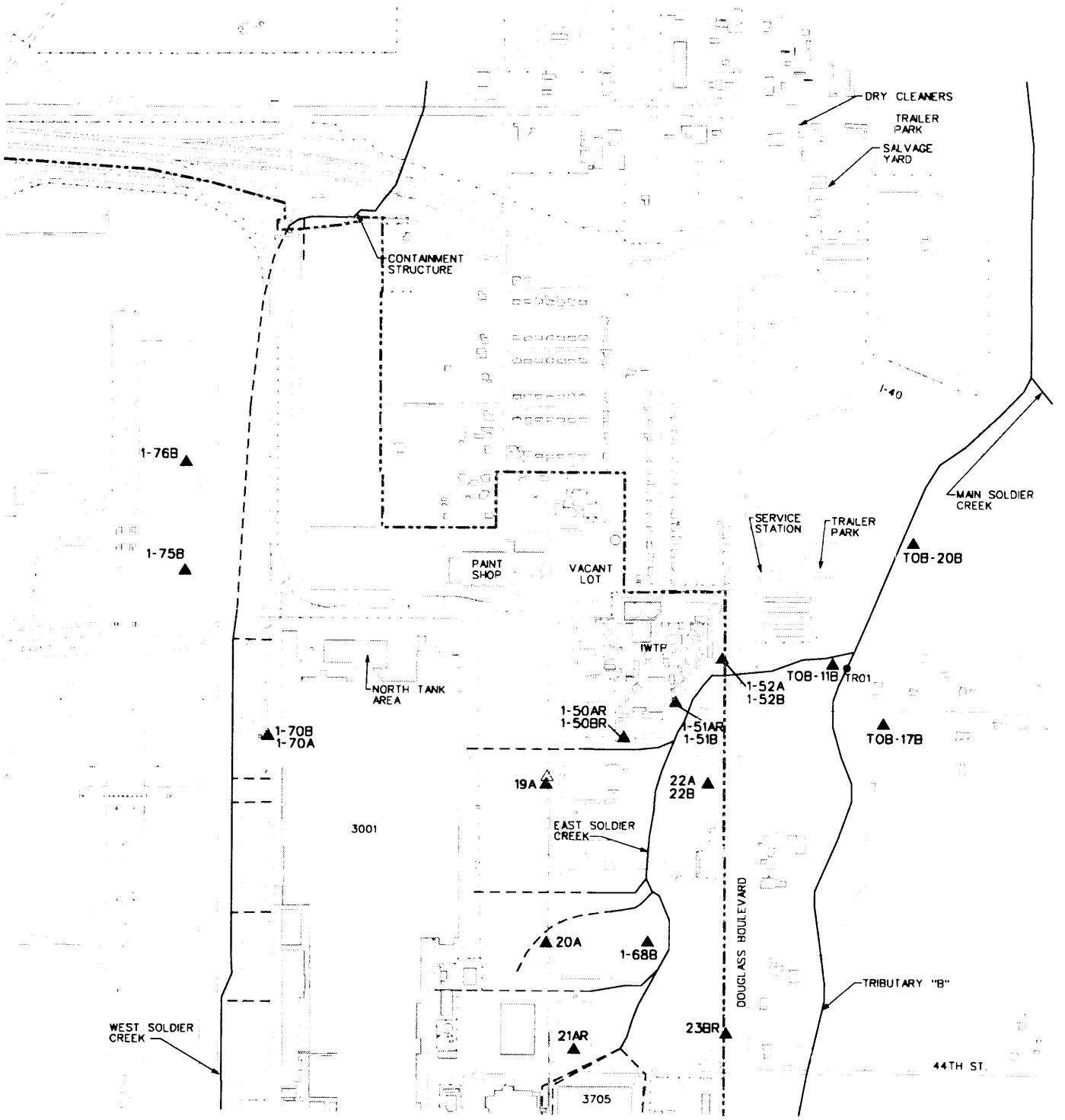
Streambed permeability measurements indicated that the hydraulic conditions along East and West Soldier Creeks, within the sediment and surface water quarterly monitoring study area, are dominated by extremely low hydraulic gradients and relatively impermeable substrate.

Influent reaches of the creek were estimated using stream discharge data, the vertical permeability measurement data, and potentiometric surface data from the aquifer. East Soldier Creek surface water stage elevations were above the aquifer potentiometric surface level from the headwater at SE 44th Street to about the confluence with Tributary B, indicating that this portion of the creek loses water, assuming sufficient permeability. Along West Soldier Creek, off-base stage data indicates the creek is losing water to the aquifer, assuming sufficient permeability.

6.2 ANALYTICAL

Figure 6-1 illustrates the location of groundwater monitoring wells near East and West Soldier Creeks sampled during the RI (PES, 1995). These monitoring wells were grouped into three categories based on their location, on-base East Soldier Creek, off-base East Soldier Creek, and on-base West Soldier Creek. No monitoring wells were sampled off-base West Soldier Creek during the RI. Tables 6-1 through 6-3 present the analytes detected in both groundwater and sediment for on-base East Soldier Creek, off-base East Soldier Creek, and on-base West Soldier Creek, respectively. Analysis from the RI and subsequent groundwater monitoring in June, August and November 1995 (Brown and Root, 1996) are compared by region to the maximum sediment results detected during the first year of quarterly monitoring of East and West Soldier Creeks in these tables.

Ten inorganic analytes were detected in both the sediment and groundwater of on-base East Soldier Creek. One pesticide analyte, four semivolatile and six volatile compounds also were detected in both the sediment and groundwater of on-base East Soldier Creek (Table 6- 1). The only analytes which were detected in both sediment and groundwater off-base East Soldier Creek were eight inorganics (Table 6-2). Six inorganic analytes were detected in the sediment on-base West Soldier Creek (Table 6-3). Two semi-volatile organics compounds and three volatile organic compounds also were detected in both sediment and groundwater of on-base West Soldier Creek.



LEGEND:

- SOLDIER CREEK AND TRIBUTARIES
- UNDERGROUND PORTION OF CREEK
- BOUNDARY OF TINKER AIR FORCE BASE
- 1-76B ▲ MONITORING WELL LOCATION

N

800 0 800 1600

SCALE FEET

MCS FILE: SOLDQ-08-RF-CTABB1

Designed By: D.D.N.	TINKER AIR FORCE BASE	
Drawn By: T.R.F.	OKLAHOMA CITY, OKLAHOMA	
Checked By: D.J.K.	TITLE: WELL LOCATION MAP	
Submitted By:	PROJECT NUMBER F93506	DATE 04/16/96
		FIG. NO. 6-1

TA. .E 6-1

COMPARISON OF MAXIMUM SEDIMENT RESULTS WITH GROUNDWATER RESULTS ON-BASE EAST SOLDIER CREEK

Analyte	Maximum Sediment Result	Sediment Sample Location	23BR Layer 3 PES	20A Layer 5 Aug 95	20A Layer 5 Nov 95	20A Layer 5 PES	21AR Layer 5 Aug 95	21AR Layer 5 Nov 95	21AR Layer 5 PES	1-68B Layer 5 June 95	1-68B Layer 5 PES	19A Layer 3&5 Aug 95
Inorganics												
Arsenic	8,400	SC-QE02-SD-301										2.9
Barium	1,850,000	SC-QE03-SD-101	1,100	292	232	280	601	553	800	89	100	826
Cadmium ,	415,000	SC-QE09-SD-401	4									
Chromium	2,040,000	SC-QE08-SD-401	210	13.3	9.1		4.3	7	9			39.9
Copper	583,000	SC-QE03-SD-301	50	NA	NA		NA	NA		NA		NA
Lead	363,000	SC-QE09-SD-401	28	1.7			3.1	2.5				2.3
Nickel	1,220,000	SC-QE02-SD-302	430	6.5	5.3		9.8	3.7		3.1		51.1
Selenium	1,400	SC-QE07-SD-201		4.2								
Silver	53,200	SC-QE02-SD-201										
Zinc	512,000	SC-QE06-SD-401	66	NA	NA		NA	NA	12	NA		NA
Pesticides and PCBs												
Heptachlor	52,000	SC-QE07-SD-401										
Semivolatile Organics												
1,2-Dichlorobenzene	2,200	SC-QE07-SD-302										
1,3-Dichlorobenzene	100	SC-QE07-SD-302										
1,4-Dichlorobenzene	280	SC-QE07-SD-302										
2-Chloronaphthalene	1,400	SC-QE08-SD-401										
Volatile Organics												
Benzene	5.6	SC-QE02-SD-302										
Chlorobenzene	18,000	SC-QE08-SD-301										
Chloroform	2.5	SC-QE07-SD-202										
Methylene Chloride	600	SC-QE08-SD-301										
Tetrachloroethene	17	SC-QE03-SD-301						3.6				290
Trichloroethene	1.9	SC-QE03-SD-301		110	120	57	3	60				2,700

Notes:
Sediment results reported in ug/kg
Groundwater results reported in ug/L
NA=Not Analyzed
PES=Groundwater analysis by PES February/March 1995
Blank spaces indicate analyte was not detected

TABLE 6-1

COMPARISON OF MAXIMUM SEDIMENT RESULTS WITH GROUNDWATER RESULTS ON-BASE EAST SOLDIER CREEK

Analyte	Maximum Sediment Result	Sediment Sample Location	19A Layer 3&5 Nov 95	19A Layer 3&5 PES	1-50BR Layer 3 June 95	1-50BR Layer 3 PES	1-51B Layer 3 June 95	1-51B Layer 3 PES	1-52B Layer 3 June 95	1-52B Layer 3 PES	22B Layer 3 June 95	22B Layer 3 PES
Inorganics												
Arsenic	8,400	SC-QE02-SD-301	5.6									
Barium	1,850,000	SC-QE03-SD-101	914	1,400	387	400	202	140	137	150	387	370
Cadmium	415,000	SC-QE09-SD-401										
Chromium	2,040,000	SC-QE08-SD-401	49.1	50	1.3		17.2	14	1.2	7	9.1	17
Copper	583,000	SC-QE03-SD-301	NA									
Lead	363,000	SC-QE09-SD-401									2.5	
Nickel	1,220,000	SC-QE02-SD-302	59	59	49	62.0	4.2		21	16	7	10
Selenium	1,400	SC-QE07-SD-201										
Silver	53,200	SC-QE02-SD-201			0.73							
Zinc	512,000	SC-QE06-SD-401	NA									
Pesticides and PCBs												
Heptachlor	52,000	SC-QE07-SD-401		0.01								
Semivolatile Organics												
1,2-Dichlorobenzene	2,200	SC-QE07-SD-302				7						
1,3-Dichlorobenzene	100	SC-QE07-SD-302										
1,4-Dichlorobenzene	280	SC-QE07-SD-302				8						
2-Chloronaphthalene	1,400	SC-QE08-SD-401				10						
Volatile Organics												
Benzene	5.6	SC-QE02-SD-302				5						
Chlorobenzene	18,000	SC-QE08-SD-301			200	250						
Chloroform	2.5	SC-QE07-SD-202					1	4				
Methylene Chloride	600	SC-QE08-SD-301										
Tetrachloroethene	17	SC-QE03-SD-301	230	140	29	37						
Trichloroethene	1.9	SC-QE03-SD-301	2,200	2,200	12	16						2.8

Notes:
Sediment results reported in ug/kg
Groundwater results reported in ug/L
NA=Not Analyzed
PES=Groundwater analysis by PES February/March 1995
Blank spaces indicate analyte was not detected

TABLE 6-1

COMPARISON OF MAXIMUM SEDIMENT RESULTS WITH GROUNDWATER RESULTS ON-BASE EAST SOLDIER CREEK

Analyte	Maximum Sediment Result	Sediment Sample Location	1-50AR Layer 5 June 95	1-50AR Layer 5 PES	1-51AR Layer 5 June 95	1-51AR Layer 5 PES	1-52A Layer 5 June 95	1-52A Layer 5 PES	22A Layer 5 June 95	22A Layer 5 PES
Inorganics										
Arsenic	8,400	SC-QE02-SD-301								
Barium	1,850,000	SC-QE03-SD-101	1,240	1,300	1,040	1,100	178	150	668	580
Cadmium	415,000	SC-QE09-SD-401								
Chromium	2,040,000	SC-QE08-SD-401	1.1		1.9		1.8		1.3	
Copper	583,000	SC-QE03-SD-301	NA		NA		NA		NA	
Lead	363,000	SC-QE09-SD-401								
Nickel	1,220,000	SC-QE02-SD-302	128	140.0	4.2	31	45.9	27	7.1	
Selenium	1,400	SC-QE07-SD-201								
Silver	53,200	SC-QE02-SD-201								
Zinc	512,000	SC-QE06-SD-401	NA		NA		NA		NA	
Pesticides and PCBs										
Heptachlor	52,000	SC-QE07-SD-401								
Semivolatile Organics										
1,2-Dichlorobenzene	2,200	SC-QE07-SD-302	120	320	46	89				
1,3-Dichlorobenzene	100	SC-QE07-SD-302		10		3				
1,4-Dichlorobenzene	280	SC-QE07-SD-302	47	110	27	49				
2-Chloronaphthalene	1,400	SC-QE08-SD-401								
Volatile Organics										
Benzene	5.6	SC-QE02-SD-302								
Chlorobenzene	18,000	SC-QE08-SD-301	730	580	280	260		4		
Chloroform	2.5	SC-QE07-SD-202								
Methylene Chloride	600	SC-QE08-SD-301				2.2				
Tetrachloroethene	17	SC-QE03-SD-301	96	75	40	21				
Trichloroethene	1.9	SC-QE03-SD-301	450	380	80	56				

Notes:
Sediment results reported in ug/kg
Groundwater results reported in ug/L
NA=Not Analyzed
PES=Groundwater analysis by PES February/March 1995
Blank spaces indicate analyte was not detected

TABLE 6-2

COMPARISON OF MAXIMUM SEDIMENT RESULTS WITH GROUNDWATER RESULTS OFF-BASE EAST SOLDIER CREEK

Analyte	Maximum Sediment Result	Sediment Sample Location	TOB-11B Layer 3 June 95	TOB-11B Layer 3 PES	TOB-17B Layer 5 June 95	TOB-17B Layer 5 PES	TOB-20B Layer 5 June 95	TOB-20B Layer 5 PES
Inorganics								
Barium	1,860,000	SC-QE10-SD-301	283	160	234	620	171	800
Chromium	831,000	SC-QE11-SD-102	4.6		1.3		7.4	
Lead	107,000	SC-QE11-SD-102					2.6	
Nickel	347,000	SC-QE11-SD-102	936				8.5	19.6
Selenium	310	SC-QE10-SD-103			4.3			
Silver	19400	SC-QE11-SD-102		15				
Zinc	268,000	SC-QE11-SD-101	NA	9	NA		NA	

Notes:
Sediment results reported in ug/kg
Groundwater results reported in ug/L
NA=Not Analyzed
PES=Groundwater analysis by PES February/March 1995
Blank spaces indicate analyte was not detected

TABLE 6-3

COMPARISON OF MAXIMUM SEDIMENT RESULTS WITH GROUNDWATER RESULTS ON-BASE WEST SOLDIER CREEK

Analyte	Maximum Sediment Result	Sediment Sample Location	1-70B Layer 1 Aug 95	1-70B Layer 1 Nov 95	1-70B Layer 1 PES	1-75B Layer 1 Aug 95	1-75B Layer 1 Nov 95	1-75B Layer 1 PES	1-70A Layer 3 Aug 95	1-70A Layer 3 Nov 95	1-70A Layer 3 PES
Inorganics											
Barium	4,700,000	SC-QW04-SD-403	49	46.6	53	568	484	490	189	170	200
Chromium	3,210,000	SC-QW04-SD-402	19.1	23	20	44.8	141		15.5	23.4	18
Lead	746,000	SC-QW04-SD-402		1.6		1.6	2.3		2.1	2.2	
Nickel	3,160,000	SC-QW03-SD-201	10.9	26.0	11	1100	1,090	220	153.0	153	19
Selenium	12,000	SC-QW03-SD-201	5.2			5.1			4.0		
Silver	205,000	SC-QW03-SD-201						7.2			
Semivolatile Organics											
1,2-Dichlorobenzene	570	SC-QW04-SD-202			8						
1,4-Dichlorobenzene	210	SC-QW04-SD-202	11		10						
Volatile Organics											
Tetrachloroethene	16	SC-QW04-SD-102	7,700	9,400	2,400					71	60
Trichloroethene	77	SC-QW04-SD-102	140,000	200,000	160,000	1,500	990	2,000	1,300	1,500	1,440
Vinyl Chloride	15	SC-QW04-SD-202									

Notes:
Sediment results reported in ug/kg
Groundwater results reported in ug/L
NA=Not Analyzed
PES=Groundwater analysis by PES February/March 1995
Blank spaces indicate analyte was not detected

TABLE 6-3

COMPARISON OF MAXIMUM SEDIMENT RESULTS WITH GROUNDWATER RESULTS ON-BASE WEST SOLDIER CREEK

Analyte	Maximum Sediment Result	Sediment Sample Location	1-76B Layer 3 Aug 95	1-76B Layer 3 Nov 95	1-76B Layer 3 PES
Inorganics					
Barium	4,700,000	SC-QW04-SD-403	2,430	4,070	3,700
Chromium	3,210,000	SC-QW04-SD-402	2.8	1.6	
Lead	746,000	SC-QW04-SD-402	2.2	1.5	
Nickel	3,160,000	SC-QW03-SD-201	4.1	2.9	
Selenium	12,000	SC-QW03-SD-201			
Silver	205,000	SC-QW03-SD-201			
Semivolatile Organics					
1,2-Dichlorobenzene	570	SC-QW04-SD-202			
1,4-Dichlorobenzene	210	SC-QW04-SD-202			
Volatile Organics					
Tetrachloroethene	16	SC-QW04-SD-102			
Trichloroethene	77	SC-QW04-SD-102			
Vinyl Chloride	15	SC-QW04-SD-202			

Notes:
Sediment results reported in ug/kg
Groundwater results reported in ug/L
NA=Not Analyzed
PES=Groundwater analysis by PES February/March 1995
Blank spaces indicate analyte was not detected

7.0
CONCLUSIONS

Sediment analyte concentrations from the first year of quarterly monitoring did not exceed the 10^{-4} screening criteria set forth in the BHRA and the HHRA. Therefore, according to the ROD, because contaminants of concern did not exceed the 10^{-4} screening criteria another alternative for remediation does not need to be evaluated (B&V, 1993b).

BHRA 10^{-6} screening criteria were exceeded by six PAHs (benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, and indeno(1,2,3-cd)pyrene), HHRA 10^{-5} screening criteria were exceeded by one pesticide (heptachlor), and one PAH (benzo(a)pyrene), and HHRA 10^{-6} screening criteria were exceeded by two pesticides (aldrin and heptachlor) and six semivolatiles (benzidine, benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene). Based on the ROD, exceedance of these 10^{-5} and 10^{-6} screening criteria may potentially indicate a need to evaluate if the exposure is unacceptable.

Due to the sampling methodology, care must be taken when drawing inferences on temporal trends of compound concentrations during the first year of quarterly monitoring. However, several trends in the detected analytes from sediment samples appear to be present in the first year of quarterly monitoring.

- Upward trends appear to have occurred in PAH concentrations during the first year of quarterly monitoring.

- The detected PAH concentrations in the sediment appear to follow the same trend (e.g., an increase in one PAH compound is associated with increases in the other detected PAH compounds). These relationships suggest that the PAHs detected within each segment have a common source of origin for that segment.

- The sampling quarter with the highest concentration of the PAH concentrations in the sediment varies between the sampling segments. This relationship suggests that multiple origins for PAHs could exist.

- Analyte concentrations are seen to decrease off-base as compared to on-base.

Surface water analyte concentrations from the first year of quarterly monitoring did not exceed any of the screening criteria set forth in the BHRA and the HHRA.

The results of the HHRA were compared to those presented in the BHRA. Despite slight differences in approach, both risk assessments concluded that there are no unacceptable cancer risks or non-carcinogenic hazards associated with exposure to East or West Soldier Creeks for any on-base or off-base populations, under current of future stream use conditions. Thus no remedial action appears to be warranted based on risks to human health.

8.0
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APPENDIX A

HUMAN HEALTH RISK ASSESSMENT

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0.0
EXECUTIVE SUMMARY

An evaluation of risks associated with Soldier Creek surface water and sediments was previously performed by Black & Veatch Waste Science Technology (B&V, 1993). Since the time of the original risk assessment, additional information on the nature and extent of stream contamination has been collected, including additional sediment and surface water sampling, as well as information on pesticides and PCBs not previously evaluated. The purpose of the present risk assessment (RA) is to provide information on potential current and future risks based on current surface water and sediment contaminant levels, to compare the results with those of B&V to see if the previous conclusions are still valid, and to develop cleanup goals for stream sediments that are protective of human populations.

This RA is performed using guidance provided in the Risk Assessment Guidance for Superfund - Part A (USEPA, 1989a) and Part B (USEPA, 1991b), Exposure Factors Handbook (USEPA, 1989b), Standard Default Exposure Factors (USEPA, 1991a), Dermal Exposure Assessment: Principles and Applications (1992a), and USEPA Supplemental Region IV Risk Assessment Guidance. (1991c). Environmental data obtained from surface water and sediment samples collected by Woodward-Clyde in the first four quarterly sampling events (WCFS, 1994), supplemented with chemical data from sediment samples collected by Parson Engineering Science (1995) were used in this RA. In addition, the RA made use of recent USEPA databases, including the Integrated Risk Information System (IRIS; USEPA, 1995), Health Effects Assessment Summary Tables (HEAST; USEPA 1992b and 1994); EPA Region III Risk-Based Concentration Table (EPA Region III, 1994) and Drinking Water Regulation and Health Advisories (USEPA, May 1995).

Based on differences in contaminant sources and exposed populations, the following four stream segments were evaluated in this risk assessment:

- West Soldier Creek, on-base
- West Soldier Creek, off-base
- East Soldier Creek, on-base
- East Soldier Creek, off-base

The chemicals of potential concern identified include metals, PCBs, chlorinated pesticides, volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs). An evaluation of potential health risks was performed for a group of exposure scenarios believed to represent potential forms of human activities that could occur at these areas. These exposure scenarios include the following:

- Construction workers involved in repair or installation of underground pipelines around or under on-base portions of the creeks; and

- Residents wading or swimming in the off-base portion of West and East Soldier Creeks. (Swimming was only evaluated for the child scenario for East Soldier Creek; all other scenarios assume wading only).

Potential health risks associated with surface water and sediment exposure were evaluated for both on-site construction workers and off-site residents. The results of the risk characterization indicate that potential cancer risks and non-carcinogenic health hazards for all scenarios are less than the advisory range of 10^{-6} to 10^{-4} and 1.0, respectively. These results indicate that exposure to surface water and sediments in West and East Soldier Creeks is not likely to result in an unacceptable cancer risk or non-carcinogenic hazard for any on-base or off-base populations under current or future stream use conditions.

The results of this current risk assessment were compared to those presented in the previous baseline risk assessment prepared by B&V (1993). The following differences in approaches/assumptions were noted between these two documents:

- The current RA evaluated PCBs/chlorinated pesticides as potential COCs. The RA prepared by B&V did not include these data;

- The individual stream segments, evaluated in the B&V RA are not identical to the segments evaluated in the current RA (the stream segments evaluated in the current RA are thought to be more representative of actual stream use); and

- Some of the exposure assumptions used in current RA are different than those used in B&V RA (e.g., the current RA uses age-corrected surface area for

evaluating exposure to surface water and sediments; B&V RA values were not age corrected, which was not required at that time).

Despite these slight difference in approach, both RAs concluded that there are no unacceptable cancer risks or non-carcinogenic hazards associated with exposure to West or East Soldier Creeks for any on-base or off-base populations, under current or future stream use conditions. Thus no remedial action appears to be warranted based on risks to human health.

As part of the risk assessment, a set of cleanup goals was developed to identify health-protective levels for each COC. Although remediation does not appear to be warranted at the present time (based on risk to human health), these cleanup goals provide a set of "action criteria", should remedial action be required in the future.

1.0
INTRODUCTION

The purpose of a risk assessment (RA), as defined by USEPA, is to "provide a framework for developing the risk information necessary to assist decision-making at remedial sites" (Risk Assessment Guidance for Superfund; RAGS: USEPA, 1989a). As such, this document specifically addresses potential risks associated with exposure to surface water and sediment from portions of East and West Soldier Creek that may have been impacted by contaminant releases from Tinker Air Force Base (AFB).

The organization of this risk assessment follows the basic structure presented in RAGS. In addition, a section has been included on the development of Remedial Action Objectives (RAOs). The individual sections of the risk assessment consist of the following:

- A discussion of pertinent site background information
- Identification of site-specific chemicals of concern for each of the four stream segments under investigation
- An exposure assessment that identifies potentially exposed populations and the exposure parameters used to quantify chemical uptake by those populations
- An assessment of the toxic properties of the chemicals of concern
- An estimation of the potential cancer risks and non-carcinogenic health hazards for exposed populations
- Development of RAOs for those chemicals of concern estimated to pose an unacceptable risk or hazard to potentially exposed populations
- An analysis of uncertainties associated with each of the steps of the risk assessment, and the likely impact of these uncertainties on the results and conclusions of the risk assessment
- Conclusions and recommendations

1.1 SITE DESCRIPTION

As illustrated on **Figure 1-1**, Tinker Air Force Base (AFB) is located within the corporate limits of Oklahoma City, Oklahoma, approximately seven miles east-southeast of Oklahoma City's metropolitan area. The base is bounded by Midwest City on the north, Del City on the northwest and Oklahoma City on the east, south and southwest. The boundaries of Tinker are defined by Sooner Road to the west, Douglas Boulevard to the east, Southeast 29th Street to the north and Southeast 74th Street to the south. Midwest City and Del City are heavily populated with residential and commercial areas. The area under Oklahoma City jurisdiction is lightly developed residential. Tinker AFB lies within an area representing a transition from residential and industrial/commercial land use on the north and west to agricultural land use to the east and south.

The principle surface water drainage ways for Tinker AFB are Crutcho, Kuhlman, and Soldier Creeks (**Figure 1-2**). The main portion of Soldier Creek is located to the east of Tinker AFB, flowing to the north from its headwaters near Southwest 59th Street to its confluence with Crutcho Creek. Two tributaries (West and East Soldier Creek) originate on the Base. For the purpose of this risk assessment, the tributary of Soldier Creek east of Building 3001 is named East Soldier Creek and the tributary west of Building 3001 is named West Soldier Creek. From its origin north of Building 3705, East Soldier Creek flows northward along the east side of Building 3001, past the Industrial Wastewater Treatment Plant (IWTP), to its confluence with Soldier Creek approximately one mile downstream. West Soldier Creek originates on the west side of Building 3001 and flows northward to its confluence with Soldier Creek approximately two miles downstream.

As identified in the Workplan (WCFS, 1994), the current scope of investigation includes those portions of East and West Soldier Creeks from their points of origin extending to their intersection with Interstate 40 north of the base. Study area boundaries were identified based on the Remedial Investigation (RI) (B&V, 1993). Data from the RI indicated that a contaminant concentration gradient exists to a point just south (upstream) of the study boundary. The study area boundary was established based on the following criteria:

- Limits of measurable levels of contaminants (as compared to background locations)
- Area of such size that a definitive assessment could be performed
- Allowance for source identification

Because the contaminants and contaminant sources for East Soldier Creek differ from West Soldier Creek, these streams are evaluated separately. In addition, on-base stream segments of both streams are evaluated separately from their off-base segments due to differences in potentially exposed populations. This evaluation of separate stream segments is similar to the approach used in the baseline risk assessment. Based on this approach, the following four stream segments are evaluated separately in this risk assessment:

- West Soldier Creek, on-base
- West Soldier Creek, off-base
- East Soldier Creek, on-base
- East Soldier Creek, off-base

1.2 SITE OPERATIONS AND REGULATORY HISTORY

Tinker is an active military industrial facility responsible for the maintenance of a wide variety of military aircraft. Tinker AFB was activated in March 1942 under the name of Midwest Air Depot. During World War II, the depot was responsible for reconditioning, modifying and modernizing aircraft, vehicles and equipment. The primary mission has not changed. Tinker is still a major industrial complex for overhauling modifying and repairing military aircraft engines and accessory items.

As part of the overall Air Force Installation Restoration Program (IRP), Tinker AFB began investigation of previously used disposal sites in 1981 (EPA, 1988). A base-wide sampling program was conducted in 1983. Analytical results from the sampling program indicated trichloroethene was present in the groundwater. Remedial investigations were conducted by Tinker AFB through the Tulsa District Corps of Engineers (COE) from 1986 to 1989 to determine the nature and extent of groundwater contamination in the building complex area. These investigations determined that chromium, in addition to trichloroethene, was a

contaminant of concern in groundwater. On July 22, 1987 the Building 3001 Site and the Soldier Creek Site were added to the National Priorities List (NPL). In 1990 and 1991, Black & Veatch Waste Science Technology (B&V) conducted a Phase I and Phase II Remedial Investigation/Feasibility Study (RI/FS) to determine the extent of sediment and surface water contamination along East, West, and Main Soldier Creek. As part of the RI, B&V performed a baseline human health risk assessment and concluded that sediment and surface water in Soldier Creek did not pose an unacceptable risk to human health (B&V, 1993). Since submission of the RI/FS, Tinker has reduced or eliminated releases from several outfalls, and the IWTP outfall is anticipated to be eliminated in the near future. As part of a follow-up study, four quarterly sampling events were performed by Woodward-Clyde Federal Services to provide supplemental sediment and surface water data on current contaminant levels, and to evaluate potential PCB and pesticide contamination, two classes of chemicals not evaluated previously.

1.3 SITE PHYSICAL SETTING

Tinker AFB is located in an area characterized by nearly level to gently rolling hills, broad flat plains, and well-entrenched main streams. Ground level ranges from 1,210 feet on the northwest side of the base to about 1,320 feet at the southeast corner of the base above mean sea level (Radian, 1985). Historic data from the Tinker weather station indicate that the average annual precipitation at Tinker AFB is approximately 34 inches per year. This rainfall occurs in a distinct, seasonal pattern, ranging from a high of 5.8 inches in May to a low of 1.2 inches in January (Parsons, 1995).

Soldier Creek and its tributaries receive surface runoff from approximately 9,000 acres. Surface runoff produces periods of high and low stream flow based on the annual precipitation cycle. Areas on Tinker AFB that contribute runoff or discharge to Soldier Creek and its tributaries include the eastern-most runway areas, the Building 3001 complex, and the IWTP. The Building 3001 complex consists of an aircraft overhaul and modification complex to support the mission of the Oklahoma City Air Logistics Center. The IWTP, located in the northeastern portion of the Base, receives industrial process discharge waters from the Building 3001 complex and other buildings and operations in the area through a series of underground lines. Once received at the plant, these waters are treated and

discharged to East Soldier Creek under a National Pollutant Discharge Elimination System (NPDES) permit. A sanitary wastewater treatment facility also discharge to East Soldier Creek under the same permit.

A storm sewer investigation was conducted by NUS (1989) to characterize the sources of the outfalls to Soldier Creek from Tinker AFB. This study identified the following four categories of waste discharge:

- Process discharge, such as cooling tower blowdown
- Low volume sources, such as oils derived from compressors, vacuum pumps and fume handling systems that enter the storm sewer system
- Inappropriate disposal of wastes, such as solvents and lubricating oils, into floor drains catch basins, etc. This is believed to represent the primary source of contamination to Soldier Creek.
- Cross-contamination between waste systems and the storm sewers due to improper connections or broken lines.

Discharges from the various Tinker outfalls are thought to represent semi-continuous sources to both East and West Soldier Creeks. Studies by Parsons (1995) indicate that the relative contribution of the outfalls bear little, if any, correlation to the annual precipitation cycle. Thus, it is likely the Tinker outfalls will have year-round influence on surface water-quality, while site runoff is more likely to influence surface water in a seasonal fashion.

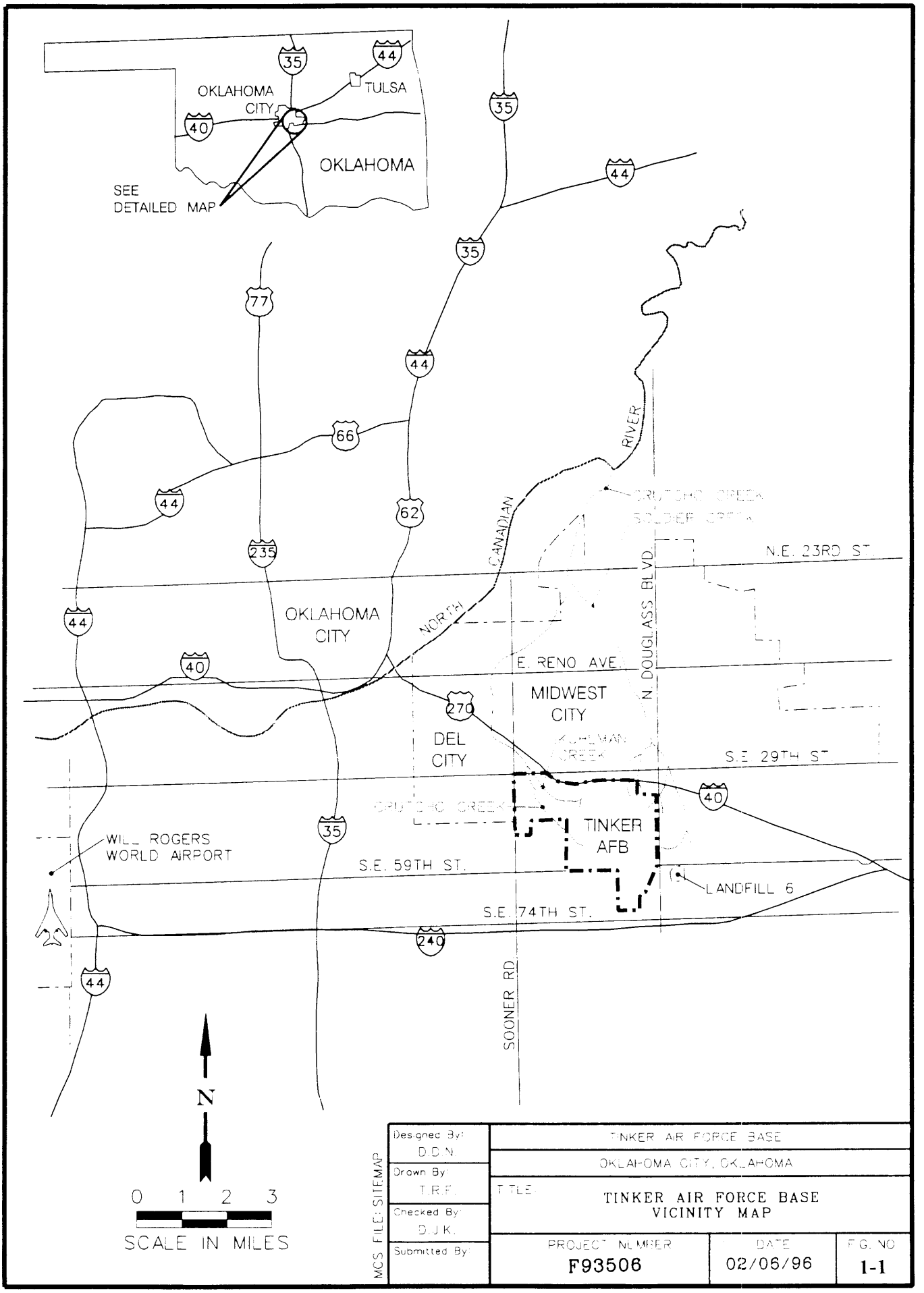
1.4 OBJECTIVES OF THE HUMAN HEALTH RISK ASSESSMENT

An evaluation of risks associated with Soldier Creek surface water and sediments was previously performed by B&V (1993). The purpose of the present document is to provide information on potential current and future risks based on current contaminant levels, to compare the results with those of B&V to see if the previous conclusions are still valid, and to develop cleanup goals for stream sediments that are protective of human populations.

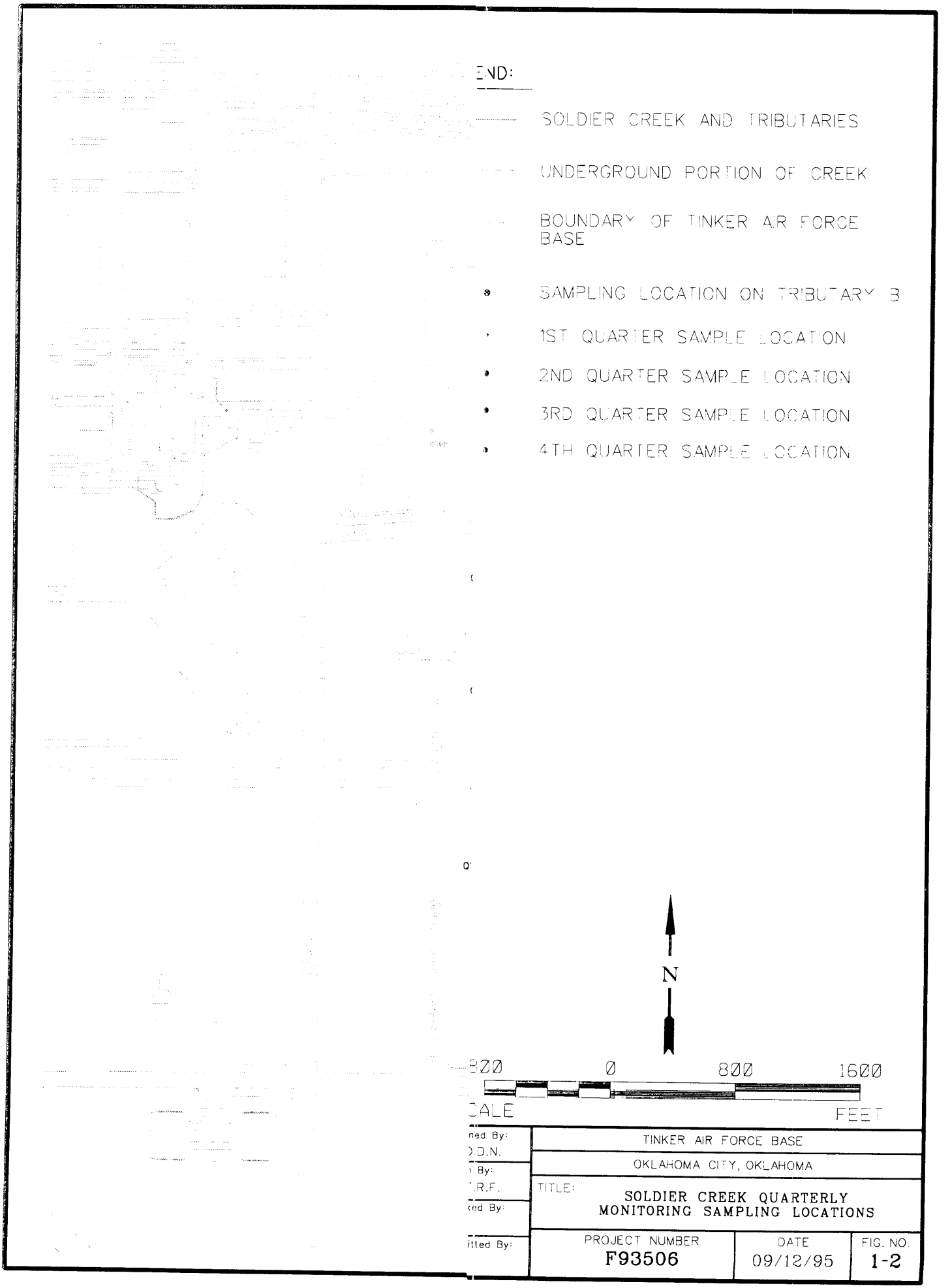
As mentioned previously, development of quantitative risk estimates for potentially exposed populations is based on guidance provided in RAGS. In addition, a variety of factors are used to characterize and quantify potential health risks, including:

- Chemical fate and transport characteristics
- Basic toxicology information
- Site-specific information relative to potentially exposed populations, exposure routes, exposure point concentrations, and general site conditions.

USEPA guidance documents used to conduct the risk assessment include RAGS, the Exposure Factors Handbook (1989b), Standard Default Exposure Factors (1991a), Health Effects Assessment Summary Tables (HEAST; 1994), Integrated Risk Information System on-line database (IRIS; 1995), Dermal Exposure Assessment: Principles and Applications (1992a) and Risk Assessment Guidance for Superfund Part B, Development of Risk-Based Preliminary Remediation Goals (1991b).



MCS FILES SITEMAP	Designed By: D.D.N.	TINKER AIR FORCE BASE	
	Drawn By: T.R.F.	OKLAHOMA CITY, OKLAHOMA	
	Checked By: D.J.K.	TITLE: TINKER AIR FORCE BASE VICINITY MAP	
	Submitted By:	PROJECT NUMBER: F93506	DATE: 02/06/96
			FIG. NO: 1-1


END:
SOLDIER CREEK AND TRIBUTARIES
UNDERGROUND PORTION OF CREEK
BOUNDARY OF TINKER AIR FORCE BASE
SAMPLING LOCATION ON TRIBUTARY B
1ST QUARTER SAMPLE LOCATION
2ND QUARTER SAMPLE LOCATION
3RD QUARTER SAMPLE LOCATION
4TH QUARTER SAMPLE LOCATION
N
800
0
800
1600
SCALE
FEET
TINKER AIR FORCE BASE
OKLAHOMA CITY, OKLAHOMA
TITLE:
SOLDIER CREEK QUARTERLY MONITORING SAMPLING LOCATIONS
PROJECT NUMBER
F93506
DATE
09/12/95
FIG. NO.
1-2

2.0
CHEMICALS OF CONCERN

The purpose of the risk assessment (RA) is to evaluate the potential human health risks associated with the site under the no-action alternative, i.e., in the absence of remedial and corrective action. The first step in this evaluation is the selection process used to identify a group of chemicals of concern (COCs). This group of chemicals, although a subset of all chemicals detected on-site, represents those chemicals posing the greatest potential health risks at the site. Thus, the quantification of potential health risks posed by the site can be focused on the COCs without significantly underestimating the total risk. The basic approach used to develop COCs in this report is similar to that used in the baseline risk assessment performed by B&V (1993). Separate lists of COCs have been generated for sediments and surface water for each of the stream segments being investigated, using EPA selection criteria. The following sections present the COC selection process.

2.1 CHEMICALS EVALUATED AS POTENTIAL COCS

The identification of COCs was based on an evaluation of chemical data from surface water and sediment samples collected by Woodward-Clyde in the first four quarterly sampling events (WCFS, 1994), supplemented with chemical data from sediment samples collected by Parson Engineering Science (Parson Engineering Science, 1995). **Table 2-1** lists the sampling locations associated with each investigation area. A total of four classes of chemicals were evaluated:

- Volatile organic compounds (46 analytes);
- Semi-volatile organic compounds (90 analytes);
- PCBs/Pesticides (30 analytes); and
- Metals (26 analytes).

The numbers in parentheses denote the number of analytes within each class of chemicals for which analyses were performed.

2.2 CHEMICALS EXCLUDED FROM THE RISK ASSESSMENT

Although the analytical results identified a number of chemicals present in sediment and surface water samples from Soldier Creek, not all of these chemicals are likely to pose risks to human health. Therefore, it is appropriate to systematically exclude selected chemicals from the HHRA so that the quantitative risk characterization can effectively focus on only those chemicals posing the greatest potential health risks. The Risk Assessment Guidance for Superfund (USEPA, 1989a) describes several procedures to reduce the number of chemicals to be considered. Chemicals can be systematically excluded for any of the following reasons:

- The compound was not detected in any sample
- The compound was found at a low frequency and concentration
- The compound was found at background levels
- The compound has a low inherent toxicity or is an essential element
- The compound was identified as a laboratory contaminant

The rationale for excluding chemicals meeting any of these criteria is that their contribution to the incremental health risks posed by the site are negligible.

The following sections present the COC selection process and final lists of COCs for surface water and sediments from East and West Soldier Creek.

2.3 COC SELECTION PROCESS

2.3.1 Chemicals Not Detected

Chemicals not detected in a specific stream segment and medium (surface water or sediment) were excluded from the medium specific COC list for that stream segment. The following tables list chemicals excluded from the COC list because they were not detected:

- **Table 2-2** lists a total of 156 chemicals for which analyses were performed but were not detected in the surface water in the on-base portion of West Soldier Creek. Therefore, these chemicals were excluded from the surface water COC list for this stream segment.

- **Table 2-3** lists a total of 167 chemicals for which analyses were performed but were not detected in the surface water in the off-base portion of West Soldier Creek. Therefore, these chemicals were excluded from the surface water COC list for this stream segment.

- **Table 2-4** lists a total of 148 chemicals for which analyses were performed but were not detected in the surface water in the on-base portion of East Soldier Creek. Therefore, these chemicals were excluded from the surface water COC list for this stream segment.

- **Table 2-5** lists a total of 160 chemicals for which analyses were performed but were not detected in the surface water in the off-base portion of East Soldier Creek. Therefore, these chemicals were excluded from the surface water COC list for this stream segment.

- **Table 2-6** lists a total of 117 chemicals for which analyses were performed but were not detected in the sediments in the on-base portion of West Soldier. Therefore, these chemicals were excluded from the sediment COC list for this stream segment.

- **Table 2-7** lists a total of 142 chemicals for which analyses were performed but were not detected in the sediments in the off-base West Soldier. Therefore, these chemicals were excluded from the sediment COC list for this stream segment.

- **Table 2-8** lists a total of 109 chemicals for which analyses were performed but were not detected in the sediments in the on-base portion of East Soldier Creek. Therefore, these chemicals were excluded from the sediment COC list for this stream segment.

- **Table 2-9** lists a total of 136 chemicals for which analyses were performed but were not detected in the sediments in the off-base portion of East Soldier Creek. Therefore, these chemicals were excluded from the sediment COC list for this stream segment.

2.3.2 Chemicals Detected at Low Frequency

Chemicals detected with low frequency do not indicate a clear pattern of contamination. Moreover, the potential health risks that may be associated with low detection frequency compounds are expected to be much lower compared with more prevalent chemicals based on frequency of human exposure. In accordance with RAGS (USEPA, 1989a), a frequency of

five percent was used as the assessment criterion (i.e., chemicals were excluded as potential COCs if they were present $\leq$ 5 percent of all samples). Because of the limited number of surface water samples collected from West Soldier Creek and the off-base portion of East Soldier Creek, no chemicals could be excluded from the COC list on the basis of low frequency of detection for these three areas. The following tables list chemicals that were excluded as potential COCs based on low frequency of criterion.

- **Table 2-10** lists a total of 7 chemicals detected at low frequency and at low concentrations in surface water samples collected from the on-base portion of East Soldier Creek. These chemicals were excluded from the surface water COC list for that stream segment.

- **Table 2-11** lists a total of 9 chemicals detected at low frequency and at low concentrations in sediments collected from the on-base portion of West Soldier Creek. These chemicals were excluded from the sediment COC list for that stream segment.

- **Table 2-12** lists a total of 22 chemicals detected at low frequency and at low concentrations in sediments collected from the on-base portion of East Soldier. These chemicals were excluded from the sediment COC list for that stream segment.

- **Table 2-13** lists a total of 9 chemicals detected at low frequency and at low concentrations in the sediments collected from the off-base portion of East Soldier Creek. These chemicals were excluded from the sediment COC list for that stream segment.

2.3.3 Essential Nutrients

Chemicals that are essential nutrients may be excluded from consideration when they are present at relatively low levels (i.e., levels that are likely to produce beneficial rather than toxic effects). Comparisons were made between the maximum detected concentrations of essential nutrients found in surface water and sediment and the recommended daily allowances (RDAs) established by the National Research Council (1989). Daily intake of nutrients from Soldier Creek was estimated by assuming that an individual ingests 0.5 L/day of surface water, (an upper bound water ingestion value assuming 10 hours swimming), or 100 mg/kg sediments (the upper-bound daily soil ingestion rate for adults).

In addition to chemicals excluded based on RDAs, sodium was also excluded, based on comparison with normal dietary intake. While sodium is an essential nutrient, there is no established RDA for this element. The normal dietary intake of sodium in the US is greater than 10,000 mg/day (Nelson, 1992), while dietary levels less than 1000 mg/day are considered "sodium-restricted."

The following tables list chemicals that are essential nutrients and that were excluded from the COC lists because they are present at concentrations that are likely to be beneficial rather than detrimental:

- A total of 11 nutrients (**Table 2-14**) were excluded from the surface water COC list for the on-base portion of West Soldier Creek.
- A total of 9 nutrients (**Table 2-15**) were excluded from the surface water COC list for the off-base portion of West Soldier Creek.
- A total of 11 nutrients (**Table 2-16**) were excluded from the surface water COC list for the on-base portion of East Soldier Creek.
- A total of 11 nutrients (**Table 2-17**) were excluded from the surface water COC list for the off-base portion of East Soldier Creek.
- A total of 10 nutrients (**Table 2-18**) were excluded from the sediment COC list for the on-base portion of West Soldier Creek.
- A total of 11 nutrients (**Table 2-19**) were excluded from the sediment COC list for the off-base portion of West Soldier Creek.
- A total of 11 nutrients (**Table 2-20**) were excluded from the sediment COC list for the on-base portion of East Soldier Creek.
- A total of 11 nutrients (**Table 2-21**) were excluded from the sediment COC list for the off-base portion of East Soldier Creek.

2.3.4 Chemicals Present at Background Concentration

As noted in RAGS (USEPA, 1989a), a comparison of sample concentrations to naturally-occurring background concentrations can be used to identify non-site-related chemicals. This approach was taken for evaluating inorganic chemicals only. The maximum concentration

for samples collected from upstream and off-base portion of Crutcho Creek was considered as the background concentration. Chemicals found to be present at concentrations within 2 times background concentrations were assumed to be present at background levels (as defined in USEPA Region IV, USEPA, 1991c), and were thus not included on the list of potential chemicals of concern. Based on this analysis, the following chemicals were excluded as potential COCs:

- A total of 6 chemicals (**Table 2-22**) were excluded from the surface water COC list on-base portion of West Soldier Creek because they were detected at background levels.

- A total of 7 chemicals (**Table 2-23**) were excluded from the surface water COC list for the off-base portion of West Soldier Creek because they were detected at background levels.

- A total of 6 chemicals (**Table 2-24**) were excluded from the surface water COC list the on-base portion of East Soldier Creek because they were detected at background levels.

- A total of 7 chemicals (**Table 2-25**) were excluded from the surface water COC list for the off-base portion of East Soldier Creek because they were detected at background levels.

- A total of 5 chemicals (Table 2-26) were excluded from the sediment COC list for the on-base portion of West Soldier Creek because they were detected at background levels.

- A total of 8 chemicals (**Table 2-27**) were excluded from the sediment COC list for the off-base portion of West Soldier Creek because they were detected at background levels.

- A total of 5 chemicals (**Table 2-28**) were excluded from the sediment COC list for the on-base portion of East Soldier Creek because they were detected at background levels.

- A total of 7 chemicals (**Table 2-29**) were excluded from the sediment COC list for the off-base portion of East Soldier Creek because they were detected at background levels.

2.3.5 Chemicals Considered as Laboratory Contaminants

By comparing the detected concentration with the laboratory method blanks, one chemical (2-butanone) detected in off-base west Soldier Creek sediment and one chemical (bis(2-Ethylhexyl)phthalate) detected in the off-base Soldier Creek surface water were considered to be laboratory contaminant and were excluded as potential COCs.

2.4 CHEMICALS OF CONCERN

A group of chemicals were identified as chemicals of concern based on the criteria described in the previous sections for each environmental medium (surface water and sediments) in each stream segment. It is important to note that many of the identified COCs are present at very low concentrations, well below health-based criteria such as MCLs. These chemicals have been retained for future evaluation as a conservative measure. The selected chemicals are further evaluated in the process of quantitative risk assessment to determine whether these chemicals may contribute risks to the human receptors discussed in **Section 3.0**. The chemicals of concern and frequency of detection are listed in the following tables:

- **Table 2-30** presents the COCs for surface water in the on-base portion of West Soldier Creek
- **Table 2-31** presents the COCs for surface water in the off-base portion of West Soldier Creek
- **Table 2-32** presents the COCs for surface water in the on-base portion of East Soldier Creek
- **Table 2-33** presents the COCs for surface water in the off-base portion of East Soldier Creek
- **Table 2-34** presents the COCs for sediments in the on-base portion of West Soldier Creek
- **Table 2-35** presents the COCs for sediments in the off-base portion of West Soldier Creek

- **Table 2-36** presents the COCs for sediments in the on-base portion of East Soldier Creek
- **Table 2-37** presents the COCs for sediments in the off-base portion of East Soldier Creek

Table 2-1

Sampling Locations in Each Stream Segment

AREA	SAMPLE LOCATION
On-Base West Soldier Creek (Area 1)	QW01 QW02 QW03 QW04
Off-Base West Soldier Creek (Area 2)	QW05 QW06
On-Base East Soldier Creek (Area 3)	QE01 QE02 QE03 QE04 QE05 QE06 QE07 QE08 QE09 SE1* SE2* SE3*
Off-Base East Soldier Creek (Area 4)	QE10 QE11 SE4* SE5*

Note: * Sample collected by Parson Engineering Science (1995).

TABLE 2-2

Chemicals Not Detected in On-Base West Soldier Creek Surface Water

Chemical Group	Chemical	Number of Samples
Metals	Antimony	7
	Beryllium	7
	Cadmium	7
	Mercury	7
	Silver	7
	Thallium	7
PCB's/Chlorinated Pesticides	4,4'-DDD	7
	4,4'-DDE	7
	4,4'-DDT	7
	Aldrin	7
	Aroclor 1016	7
	Aroclor 1221	7
	Aroclor 1232	7
	Aroclor 1242	7
	Aroclor 1248	7
	Aroclor 1254	7
	Aroclor 1260	7
	Dieldrin	7
	Endosulfan I	7
	Endosulfan II	7
	Endosulfan sulfate	7
	Endrin	7
	Endrin aldehyde	7
	Heptachlor	7
	Heptachlor epoxide	7
	Methoxychlor	7
	Toxaphene	7
	alpha-BHC	7
	alpha-Chlordane	7
	beta-BHC	7
	delta-BHC	7
	gamma-BHC (Lindane)	7
	gamma-Chlordane	7
Semivolatile Organics	1,2,4,5-Tetrachloro-benzene	7
	1,2,4-Trichlorobenzene	7
	1,2-Dichlorobenzene	7
	1,3-Dichlorobenzene	7
	1,4-Dichlorobenzene	7
	1-Chloronaphthalene	7
	1-Naphthylamine	7
	2,3,4,6-Tetrachlorophenol	7
	2,4,5-Trichlorophenol	7
	2,4,6-Trichlorophenol	7
	2,4-Dichlorophenol	7

TABLE 2-2

Chemicals Not Detected in On-Base West Soldier Creek Surface Water

Chemical Group	Chemical	Number of Samples
Semivolatile Organics	2,4-Dimethylphenol	7
(Continued)	2,4-Dinitrophenol	7
	2,4-Dinitrotoluene	7
	2,6-Dichlorophenol	7
	2,6-Dinitrotoluene	7
	2-Chloronaphthalene	7
	2-Chlorophenol	7
	2-Methylnaphthalene	7
	2-Methylphenol	7
	2-Naphthylamine	7
	2-Nitrophenol	7
	2-Picoline	7
	3,3'-Dichlorobenzidine	7
	3-Methylcholanthrene	7
	3-Nitroaniline	7
	4,6-Dinitro-2-methylphenol	7
	4-Aminobiphenyl	7
	4-Bromophenylphenyl ether	7
	4-Chloro-3-methylphenol	7
	4-Chloroaniline	7
	4-Chlorophenyl phenyl ether	7
	4-Nitroaniline	7
	4-Nitrophenol	7
	7,12-Dimethylbenz(a)-anthracene	7
	Acenaphthene	7
	Acenaphthylene	7
	Acetophenone	7
	Aniline	7
	Anthracene	7
	Azobenzene	7
	Benzidine	7
	Benzo(a)anthracene	7
	Benzo(a)pyrene	7
	Benzo(b)fluoranthene	7
	Benzo(g,h,i)perylene	7
	Benzo(k)fluoranthene	7
	Benzoic acid	7
	Benzyl alcohol	7
	Butyl benzyl phthalate	7
	Chrysene	7
	Di-n-butyl phthalate	7
	Di-n-octyl phthalate	7
	Dibenz(a,h)anthracene	7
	Dibenzofuran	7

TABLE 2-2

Chemicals Not Detected in On-Base West Soldier Creek Surface Water

Chemical Group	Chemical	Number of Samples
Semivolatile Organics	Diethyl phthalate	7
(Continued)	Dimethyl phthalate	7
	Diphenylamine	7
	Ethyl methanesulfonate	7
	Fluoranthene	7
	Fluorene	7
	Hexachlorobenzene	7
	Hexachlorobutadiene	7
	Hexachlorocyclopentadiene	7
	Hexachloroethane	7
	Indeno(1,2,3-cd)pyrene	7
	Isophorone	7
	Methyl methanesulfonate	7
	N-Nitroso-di-n-butylamine	7
	N-Nitrosodiphenylamine	7
	N-Nitrosopiperidine	7
	Naphthalene	7
	Nitrobenzene	7
	Pentachlorobenzene	7
	Pentachloronitrobenzene	7
	Pentachlorophenol	7
	Phenacetin	7
	Phenanthrene	7
	Pronamide	7
	Pyrene	7
	a,a-Dimethylphenethyl-amine	7
	bis(2-Chloroethoxy)methane	7
	bis(2-Chloroethyl) ether	7
	bis(2-Chloroisopropyl)ether	7
	bis(2-Ethylhexyl)phthalate	7
	p-Dimethylaminoazobenzene	7
Volatile Organics	1,1,1,2-Tetrachloroethane	7
	1,1,1-Trichloroethane	7
	1,1,2,2-Tetrachloroethane	7
	1,1,2-Trichloroethane	7
	1,1-Dichloroethane	7
	1,1-Dichloroethene	7
	1,2,3-Trichloropropane	7
	1,2-Dichloroethane	7
	1,2-Dichloropropane	7
	2-Butanone (MEK)	7
	2-Hexanone	7
	4-Methyl-2-pentanone (MIBK)	7
	Acrolein	7

TABLE 2-2

Chemicals Not Detected in On-Base West Soldier Creek Surface Water

Chemical Group	Chemical	Number of Samples
Volatile Organics	Acrylonitrile	7
(Continued)	Benzene	7
	Bromodichloromethane	7
	Bromoform	7
	Bromomethane	7
	Carbon disulfide	7
	Carbon tetrachloride	7
	Chloroethane	7
	Chloroform	7
	Chloromethane	7
	Dibromochloromethane	7
	Dibromomethane	7
	Dichlorodifluoromethane	7
	Ethyl methacrylate	7
	Ethylbenzene	7
	Iodomethane	7
	Styrene	7
	Trichlorofluoromethane	7
	Vinyl acetate	7
	Xylenes (total)	7
	cis-1,3-Dichloropropene	7
	trans-1,2-Dichloroethene	7
	trans-1,3-Dichloropropene	7
	trans-1,4-Dichloro-2-butene	7

TABLE 2-3

Chemicals Not Detected in Off-Base West Soldier Creek Surface Water

Chemical Group	Chemical	Number of Samples
Metals	Antimony	8
	Beryllium	8
	Cadmium	8
	Chromium	8
	Cobalt	8
	Mercury	8
	Nickel	8
	Selenium	8
	Silver	8
PCB's/Chlorinated Pesticides	4,4'-DDD	8
	4,4'-DDE	8
	4,4'-DDT	8
	Aldrin	8
	alpha-BHC	8
	alpha-Chlordane	8
	Aroclor 1016	8
	Aroclor 1221	8
	Aroclor 1232	8
	Aroclor 1242	8
	Aroclor 1248	8
	Aroclor 1254	8
	Aroclor 1260	8
	beta-BHC	8
	delta-BHC	8
	Dieldrin	8
	Endosulfan I	8
	Endosulfan II	8
	Endosulfan sulfate	8
	Endrin	8
	Endrin aldehyde	8
	gamma-BHC (Lindane)	8
	gamma-Chlordane	8
	Heptachlor	8
	Heptachlor epoxide	8
	Methoxychlor	8
	Toxaphene	8
Semivolatile Organics	1,2,4,5-Tetrachloro-benzene	8
	1,2,4-Trichlorobenzene	8
	1,2-Dichlorobenzene	8
	1,3-Dichlorobenzene	8
	1,4-Dichlorobenzene	8
	1-Chloronaphthalene	8
	1-Naphthylamine	8
	2,3,4,6-Tetrachlorophenol	8

TABLE 2-3

Chemicals Not Detected in Off-Base West Soldier Creek Surface Water

Chemical Group	Chemical	Number of Samples
Semivolatile Organics	2,4,5-Trichlorophenol	8
(Continued)	2,4,6-Trichlorophenol	8
	2,4-Dichlorophenol	8
	2,4-Dimethylphenol	8
	2,4-Dinitrophenol	8
	2,4-Dinitrotoluene	8
	2,6-Dichlorophenol	8
	2,6-Dinitrotoluene	8
	2-Chloronaphthalene	8
	2-Chlorophenol	8
	2-Methylnaphthalene	8
	2-Methylphenol	8
	2-Naphthylamine	8
	2-Nitrophenol	8
	2-Picoline	8
	3,3'-Dichlorobenzidine	8
	3,3'-Dimethylbenzidine	2
	3-Methylcholanthrene	8
	3-Nitroaniline	8
	3/4-Methylphenol	8
	4,6-Dinitro-2-methylphenol	8
	4-Aminobiphenyl	8
	4-Bromophenylphenyl ether	8
	4-Chloro-3-methylphenol	8
	4-Chloroaniline	8
	4-Chlorophenyl phenyl ether	8
	4-Nitroaniline	8
	4-Nitrophenol	8
	7,12-Dimethylbenz(a)-anthracene	8
	a,a-Dimethylphenethyl-amine	8
	Acenaphthene	8
	Acenaphthylene	8
	Acetophenone	8
	Aniline	8
	Anthracene	8
	Azobenzene	8
	Benzidine	8
	Benzo(a)anthracene	8
	Benzo(a)pyrene	8
	Benzo(b)fluoranthene	8
	Benzo(g,h,i)perylene	8
	Benzo(k)fluoranthene	8
	Benzoic acid	8
	Benzyl alcohol	8

TABLE 2-3

Chemicals Not Detected in Off-Base West Soldier Creek Surface Water

Chemical Group	Chemical	Number of Samples
Semivolatile Organics	bis(2-Chloroethoxy)methane	8
(Continued)	bis(2-Chloroethyl) ether	8
	bis(2-Chloroisopropyl)ether	8
	Butyl benzyl phthalate	8
	Chrysene	8
	Di-n-butyl phthalate	8
	Di-n-octyl phthalate	8
	Dibenz(a,h)anthracene	8
	Dibenzofuran	8
	Diethyl phthalate	8
	Dimethyl phthalate	8
	Diphenylamine	8
	Ethyl methanesulfonate	8
	Fluoranthene	8
	Fluorene	8
	Hexachlorobenzene	8
	Hexachlorobutadiene	8
	Hexachlorocyclopentadiene	8
	Hexachloroethane	8
	Indeno(1,2,3-cd)pyrene	8
	Isophorone	8
	Methyl methanesulfonate	8
	N-Nitroso-di-n-butylamine	8
	N-Nitroso-di-n-propylamine	8
	N-Nitrosodiphenylamine	8
	N-Nitrosopiperidine	8
	Naphthalene	8
	Nitrobenzene	8
	p-Dimethylaminoazobenzene	8
	Pentachlorobenzene	8
	Pentachloronitrobenzene	8
	Pentachlorophenol	8
	Phenacetin	8
	Phenanthrene	8
	Phenol	8
	Pronamide	8
	Pyrene	8
Volatile Organics	1,1,1,2-Tetrachloroethane	8
	1,1,1-Trichloroethane	8
	1,1,2,2-Tetrachloroethane	4
	1,1,2-Trichloroethane	8
	1,1-Dichloroethane	8
	1,1-Dichloroethene	8
	1,2,3-Trichloropropane	8

TABLE 2-3

Chemicals Not Detected in Off-Base West Soldier Creek Surface Water

Chemical Group	Chemical	Number of Samples
Volatile Organics	1,2-Dichloroethane	8
(Continued)	1,2-Dichloropropane	8
	2-Butanone (MEK)	8
	2-Hexanone	8
	4-Methyl-2-pentanone (MIBK)	8
	Acetone	8
	Acrolein	8
	Acrylonitrile	8
	Benzene	8
	Bromodichloromethane	8
	Bromoform	8
	Bromomethane	8
	Carbon tetrachloride	8
	Chlorobenzene	8
	Chloroethane	8
	Chloroform	8
	Chloromethane	8
	cis-1,3-Dichloropropene	8
	Dibromochloromethane	8
	Dibromomethane	8
	Dichlorodifluoromethane	8
	Ethyl methacrylate	8
	Ethylbenzene	8
	Iodomethane	8
	Styrene	8
	Tetrachloroethene	8
	Toluene	8
	trans-1,2-Dichloroethene	8
	trans-1,3-Dichloropropene	8
	trans-1,4-Dichloro-2-butene	8
	Trichloroethene	8
	Trichlorofluoromethane	8
	Vinyl acetate	8
	Vinyl chloride	8
	Xylenes (total)	8

TABLE 2-4

Chemicals Not Detected in On-Base East Soldier Creek Surface Water

Chemical Group	Chemical	Number of Samples
Metals	Thallium	36
	Antimony	36
	Beryllium	36
	Silver	36
PCB's/Chlorinated Pesticides	4,4'-DDD	36
	4,4'-DDE	36
	4,4'-DDT	36
	Aroclor 1016	36
	Aroclor 1221	36
	Aroclor 1232	36
	Aroclor 1242	36
	Aroclor 1248	36
	Aroclor 1254	36
	Aroclor 1260	36
	Dieldrin	36
	Endosulfan I	36
	Endosulfan II	36
	Endosulfan sulfate	36
	Endrin	36
	Endrin aldehyde	36
	Heptachlor	36
	Heptachlor epoxide	36
	Methoxychlor	36
	Toxaphene	36
	alpha-BHC	36
	alpha-Chlordane	36
	beta-BHC	36
	delta-BHC	36
	gamma-BHC (Lindane)	36
	gamma-Chlordane	36
Semivolatile Organics	1,2,4,5-Tetrachloro-benzene	36
	1,2,4-Trichlorobenzene	36
	1,2-Dichlorobenzene	36
	1,3-Dichlorobenzene	36
	1,4-Dichlorobenzene	36
	1-Chloronaphthalene	36
	1-Naphthylamine	36
	2,3,4,6-Tetrachlorophenol	36
	2,4,5-Trichlorophenol	36
	2,4,6-Trichlorophenol	36
	2,4-Dichlorophenol	36
	2,4-Dimethylphenol	36
	2,4-Dinitrophenol	36
	2,4-Dinitrotoluene	36

TABLE 2-4

Chemicals Not Detected in On-Base East Soldier Creek Surface Water

Chemical Group	Chemical	Number of Samples
Semivolatile Organics	2,6-Dichlorophenol	36
(Continued)	2,6-Dinitrotoluene	36
	2-Chloronaphthalene	36
	2-Chlorophenol	36
	2-Methylnaphthalene	36
	2-Methylphenol	36
	2-Naphthylamine	36
	2-Nitrophenol	36
	2-Picoline	36
	3,3'-Dichlorobenzidine	36
	3-Methylcholanthrene	36
	3-Nitroaniline	36
	4,6-Dinitro-2-methylphenol	36
	4-Aminobiphenyl	36
	4-Bromophenylphenyl ether	36
	4-Chloro-3-methylphenol	36
	4-Chloroaniline	36
	4-Chlorophenyl phenyl ether	36
	4-Nitroaniline	36
	7,12-Dimethylbenz(a)-anthracene	36
	Acenaphthene	36
	Acenaphthylene	36
	Acetophenone	36
	Aniline	36
	Anthracene	36
	Azobenzene	36
	Benzidine	36
	Benzo(a)anthracene	36
	Benzo(a)pyrene	36
	Benzo(b)fluoranthene	36
	Benzo(g,h,i)perylene	36
	Benzo(k)fluoranthene	36
	Butyl benzyl phthalate	36
	Chrysene	36
	Di-n-butyl phthalate	36
	Di-n-octyl phthalate	36
	Dibenz(a,h)anthracene	36
	Dibenzofuran	36
	Dimethyl phthalate	36
	Diphenylamine	36
	Ethyl methanesulfonate	36
	Fluorene	36
	Hexachlorobenzene	36
	Hexachlorobutadiene	36

TABLE 2-4

Chemicals Not Detected in On-Base East Soldier Creek Surface Water

Chemical Group	Chemical	Number of Samples
Semivolatile Organics	Hexachlorocyclopentadiene	36
(Continued)	Hexachloroethane	36
	Indeno(1,2,3-cd)pyrene	36
	Isophorone	36
	Methyl methanesulfonate	36
	N-Nitroso-di-n-butylamine	36
	N-Nitroso-di-n-propylamine	36
	N-Nitrosodiphenylamine	36
	N-Nitrosopiperidine	36
	Naphthalene	36
	Nitrobenzene	36
	Pentachlorobenzene	36
	Pentachloronitrobenzene	36
	Pentachlorophenol	36
	Phenacetin	36
	Pronamide	36
	Pyrene	36
	a,a-Dimethylphenethyl-amine	36
	bis(2-Chloroethoxy)methane	36
	bis(2-Chloroethyl) ether	36
	bis(2-Chloroisopropyl)ether	36
	p-Dimethylaminoazobenzene	36
Volatile Organics	3,3'-Dimethylbenzidine	9
	1,1,2,2-Tetrachloroethane	18
	1,1,1,2-Tetrachloroethane	36
	1,1,1-Trichloroethane	36
	1,1,2-Trichloroethane	36
	1,1-Dichloroethane	36
	1,1-Dichloroethene	36
	1,2,3-Trichloropropane	36
	1,2-Dichloroethane	36
	1,2-Dichloropropane	36
	2-Hexanone	36
	4-Methyl-2-pentanone (MIBK)	36
	Acrolein	36
	Acrylonitrile	36
	Benzene	36
	Bromodichloromethane	36
	Bromomethane	36
	Carbon disulfide	36
	Carbon tetrachloride	36
	Chlorobenzene	36
	Chloroethane	36
	Chloromethane	36

TABLE 2-4

Chemicals Not Detected in On-Base East Soldier Creek Surface Water

Chemical Group	Chemical	Number of Samples
Volatile Organics	Dibromochloromethane	36
(Continued)	Dibromomethane	36
	Dichlorodifluoromethane	36
	Ethyl methacrylate	36
	Ethylbenzene	36
	Iodomethane	36
	Styrene	36
	Trichloroethene	36
	Trichlorofluoromethane	36
	Vinyl acetate	36
	Vinyl chloride	36
	Xylenes (total)	36
	cis-1,3-Dichloropropene	36
	trans-1,2-Dichloroethene	36
	trans-1,3-Dichloropropene	36
	trans-1,4-Dichloro-2-butene	36

TABLE 2-5

Chemicals Not Detected in Off-Base East Soldier Creek Surface Water

Chemical Group	Chemical	Number of Samples
Metals	Mercury	8
	Antimony	8
	Beryllium	8
	Silver	8
PCB's/Chlorinated Pesticides	4,4'-DDD	8
	4,4'-DDE	8
	4,4'-DDT	8
	alpha-BHC	8
	alpha-Chlordane	8
	Aroclor 1016	8
	Aroclor 1221	8
	Aroclor 1232	8
	Aroclor 1242	8
	Aroclor 1248	8
	Aroclor 1254	8
	Aroclor 1260	8
	beta-BHC	8
	delta-BHC	8
	Dieldrin	8
	Endosulfan I	8
	Endosulfan II	8
	Endosulfan sulfate	8
	Endrin	8
	Endrin aldehyde	8
	gamma-BHC (Lindane)	8
	gamma-Chlordane	8
	Heptachlor	8
	Heptachlor epoxide	8
	Methoxychlor	8
	Toxaphene	8
Semivolatile Organics	1,2,4,5-Tetrachloro-benzene	8
	1,2,4-Trichlorobenzene	8
	1,2-Dichlorobenzene	8
	1,3-Dichlorobenzene	8
	1,4-Dichlorobenzene	8
	1-Chloronaphthalene	8
	1-Naphthylamine	8
	2,3,4,6-Tetrachlorophenol	8
	2,4,5-Trichlorophenol	8
	2,4,6-Trichlorophenol	8
	2,4-Dichlorophenol	8
	2,4-Dimethylphenol	8
	2,4-Dinitrophenol	8
	2,4-Dinitrotoluene	8

TABLE 2-5

Chemicals Not Detected in Off-Base East Soldier Creek Surface Water

Chemical Group	Chemical	Number of Samples
Semivolatile Organics	2,6-Dichlorophenol	8
(Continued)	2,6-Dinitrotoluene	8
	2-Chloronaphthalene	8
	2-Chlorophenol	8
	2-Methylnaphthalene	8
	2-Methylphenol	8
	2-Naphthylamine	8
	2-Nitrophenol	8
	2-Picoline	8
	3,3'-Dichlorobenzidine	8
	3,3'-Dimethylbenzidine	2
	3-Methylcholanthrene	8
	3-Nitroaniline	8
	3/4-Methylphenol	8
	4,6-Dinitro-2-methylphenol	8
	4-Aminobiphenyl	8
	4-Bromophenylphenyl ether	8
	4-Chloro-3-methylphenol	8
	4-Chloroaniline	8
	4-Chlorophenyl phenyl ether	8
	4-Nitroaniline	8
	4-Nitrophenol	8
	7,12-Dimethylbenz(a)-anthracene	8
	a,a-Dimethylphenethyl-amine	8
	Acenaphthene	8
	Acenaphthylene	8
	Acetophenone	8
	Aniline	8
	Anthracene	8
	Azobenzene	8
	Benzidine	8
	Benzo(a)anthracene	8
	Benzo(a)pyrene	8
	Benzo(b)fluoranthene	8
	Benzo(g,h,i)perylene	8
	Benzo(k)fluoranthene	8
	Benzoic acid	8
	Benzyl alcohol	8
	bis(2-Chloroethoxy)methane	8
	bis(2-Chloroethyl) ether	8
	bis(2-Chloroisopropyl)ether	8
	Butyl benzyl phthalate	8
	Chrysene	8
	Di-n-butyl phthalate	8

TABLE 2-5

Chemicals Not Detected in Off-Base East Soldier Creek Surface Water

Chemical Group	Chemical	Number of Samples
Semivolatile Organics	Di-n-octyl phthalate	8
(Continued)	Dibenz(a,h)anthracene	8
	Dibenzofuran	8
	Diethyl phthalate	8
	Dimethyl phthalate	8
	Diphenylamine	8
	Ethyl methanesulfonate	8
	Fluoranthene	8
	Fluorene	8
	Hexachlorobenzene	8
	Hexachlorobutadiene	8
	Hexachlorocyclopentadiene	8
	Hexachloroethane	8
	Indeno(1,2,3-cd)pyrene	8
	Isophorone	8
	Methyl methanesulfonate	8
	N-Nitroso-di-n-butylamine	8
	N-Nitroso-di-n-propylamine	8
	N-Nitrosodiphenylamine	8
	N-Nitrosopiperidine	8
	Naphthalene	8
	Nitrobenzene	8
	p-Dimethylaminoazobenzene	8
	Pentachlorobenzene	8
	Pentachloronitrobenzene	8
	Pentachlorophenol	8
	Phenacetin	8
	Phenanthrene	8
	Pronamide	8
	Pyrene	8
Volatile Organics	1,1,1,2-Tetrachloroethane	8
	1,1,1-Trichloroethane	8
	1,1,2,2-Tetrachloroethane	4
	1,1,2-Trichloroethane	8
	1,1-Dichloroethane	8
	1,1-Dichloroethene	8
	1,2,3-Trichloropropane	8
	1,2-Dichloroethane	8
	1,2-Dichloropropane	8
	2-Butanone (MEK)	8
	2-Hexanone	8
	4-Methyl-2-pentanone (MIBK)	8
	Acrolein	8
	Acrylonitrile	8

TABLE 2-5

Chemicals Not Detected in Off-Base East Soldier Creek Surface Water

Chemical Group	Chemical	Number of Samples
Volatile Organics	Benzene	8
(Continued)	Bromodichloromethane	8
	Bromoform	8
	Bromomethane	8
	Carbon disulfide	8
	Carbon tetrachloride	8
	Chlorobenzene	8
	Chloroethane	8
	Chloroform	8
	Chloromethane	8
	cis-1,3-Dichloropropene	8
	Dibromochloromethane	8
	Dibromomethane	8
	Dichlorodifluoromethane	8
	Ethyl methacrylate	8
	Ethylbenzene	8
	Iodomethane	8
	Styrene	8
	Tetrachloroethene	8
	Toluene	8
	trans-1,2-Dichloroethene	8
	trans-1,3-Dichloropropene	8
	trans-1,4-Dichloro-2-butene	8
	Trichloroethene	8
	Trichlorofluoromethane	8
	Vinyl acetate	8
	Vinyl chloride	8
	Xylenes (total)	8

TABLE 2-6

Chemicals Not Detected in On-Base West Soldier Creek Sediments

Chemical Group	Chemical	Number of Samples
PCB's/Chlorinated Pesticides	4,4'-DDD	38
	4,4'-DDE	38
	4,4'-DDT	38
	alpha-BHC	38
	alpha-Chlordane	38
	Aroclor 1016	38
	Aroclor 1221	38
	Aroclor 1232	38
	Aroclor 1242	38
	Aroclor 1248	38
	Aroclor 1260	38
	beta-BHC	38
	delta-BHC	38
	Dieldrin	38
	Endosulfan I	38
	Endosulfan II	38
	Endosulfan sulfate	38
	Endrin	38
	Endrin aldehyde	38
	gamma-BHC (Lindane)	38
	gamma-Chlordane	38
	Heptachlor	38
	Heptachlor epoxide	38
	Methoxychlor	38
	Toxaphene	38
Semivolatile Organics	1,2,4,5-Tetrachloro-benzene	38
	1,2,4-Trichlorobenzene	38
	1,3-Dichlorobenzene	38
	1-Chloronaphthalene	38
	1-Naphthylamine	38
	2,3,4,6-Tetrachlorophenol	38
	2,4,5-Trichlorophenol	38
	2,4,6-Trichlorophenol	38
	2,4-Dichlorophenol	38
	2,4-Dinitrophenol	38
	2,4-Dinitrotoluene	38
	2,6-Dichlorophenol	38
	2,6-Dinitrotoluene	38
	2-Chloronaphthalene	38
	2-Chlorophenol	38
	2-Methylphenol	38
	2-Naphthylamine	38
	2-Nitrophenol	38
	2-Picoline	38

TABLE 2-6

Chemicals Not Detected in On-Base West Soldier Creek Sediments

Chemical Group	Chemical	Number of Samples
Semivolatile Organics	3,3'-Dichlorobenzidine	38
(Continued)	3-Methylcholanthrene	38
	3-Nitroaniline	38
	4,6-Dinitro-2-methylphenol	38
	4-Aminobiphenyl	38
	4-Bromophenylphenyl ether	38
	4-Chloro-3-methylphenol	38
	4-Chloroaniline	38
	4-Chlorophenyl phenyl ether	38
	4-Nitroaniline	38
	4-Nitrophenol	38
	7,12-Dimethylbenz(a)-anthracene	38
	a,a-Dimethylphenethyl-amine	38
	Aniline	38
	Azobenzene	38
	Benzyl alcohol	38
	bis(2-Chloroethoxy)methane	38
	bis(2-Chloroethyl) ether	38
	bis(2-Chloroisopropyl)ether	38
	Diethyl phthalate	38
	Diphenylamine	38
	Ethyl methanesulfonate	38
	Hexachlorobenzene	38
	Hexachlorobutadiene	38
	Hexachlorocyclopentadiene	38
	Hexachloroethane	38
	Isophorone	38
	Methyl methanesulfonate	38
	N-Nitroso-di-n-propylamine	38
	N-Nitroso-di-n-butylamine	38
	N-Nitrosodiphenylamine	38
	N-Nitrosopiperidine	38
	Nitrobenzene	38
	p-Dimethylaminoazobenzene	38
	Pentachlorobenzene	38
	Pentachloronitrobenzene	38
	Phenacetin	38
	Phenol	38
	Pronamide	38
Volatile Organics	1,1,1,2-Tetrachloroethane	28
	1,1,1-Trichloroethane	38
	1,1,2,2-Tetrachloroethane	29
	1,1,2-Trichloroethane	38
	1,1-Dichloroethane	38

TABLE 2-6

Chemicals Not Detected in On-Base West Soldier Creek Sediments

Chemical Group	Chemical	Number of Samples
Volatile Organics	1,1-Dichloroethene	38
(Continued)	1,2,3-Trichloropropane	38
	1,2-Dichloroethane	38
	1,2-Dichloropropane	38
	2-Chloroethyl vinyl ether	38
	2-Hexanone	38
	4-Methyl-2-pentanone (MIBK)	38
	Acrolein	38
	Acrylonitrile	38
	Bromodichloromethane	38
	Bromoform	38
	Bromomethane	38
	Carbon tetrachloride	38
	Chloroethane	38
	Chloroform	38
	cis-1,3-Dichloropropene	38
	Dibromochloromethane	38
	Dibromomethane	38
	Dichlorodifluoromethane	38
	Ethanol	38
	Ethyl methacrylate	38
	Iodomethane	38
	Styrene	38
	trans-1,2-Dichloroethene	38
	trans-1,3-Dichloropropene	38
	trans-1,4-Dichloro-2-butene	19
	trans-1,4-Dichloro-2-butene	19
	Trichlorofluoromethane	38
	Vinyl acetate	38

TABLE 2-7

Chemicals Not Detected in Off-Base West Soldier Creek Sediments

Chemical Group	Chemical	Number of Samples
Metals	Thallium	8
PCB's/Chlorinated Pesticides	4,4'-DDD	8
	4,4'-DDE	8
	4,4'-DDT	8
	alpha-BHC	8
	alpha-Chlordane	8
	Aroclor 1016	8
	Aroclor 1221	8
	Aroclor 1232	8
	Aroclor 1242	8
	Aroclor 1248	8
	Aroclor 1260	8
	beta-BHC	8
	Dieldrin	8
	Endosulfan I	8
	Endosulfan II	8
	Endosulfan sulfate	8
	Endrin	8
	Endrin aldehyde	8
	gamma-BHC (Lindane)	8
	gamma-Chlordane	8
	Heptachlor	8
	Heptachlor epoxide	8
	Methoxychlor	8
	Toxaphene	8
Semivolatile Organics	1,2,4,5-Tetrachloro-benzene	8
	1,2,4-Trichlorobenzene	8
	1,2-Dichlorobenzene	8
	1,3-Dichlorobenzene	8
	1,4-Dichlorobenzene	8
	1-Chloronaphthalene	8
	1-Naphthylamine	8
	2,3,4,6-Tetrachlorophenol	8
	2,4,5-Trichlorophenol	8
	2,4,6-Trichlorophenol	8
	2,4-Dichlorophenol	8
	2,4-Dimethylphenol	8
	2,4-Dinitrophenol	8
	2,4-Dinitrotoluene	8
	2,6-Dichlorophenol	8
	2,6-Dinitrotoluene	8
	2-Chloronaphthalene	8
	2-Chlorophenol	8
	2-Methylnaphthalene	8

TABLE 2-7

Chemicals Not Detected in Off-Base West Soldier Creek Sediments

Chemical Group	Chemical	Number of Samples
Semivolatile Organics	2-Methylphenol	8
(Continued)	2-Naphthylamine	8
	2-Nitrophenol	8
	2-Picoline	8
	3,3'-Dichlorobenzidine	8
	3-Methylcholanthrene	8
	3-Nitroaniline	8
	3/4-Methylphenol	8
	4,6-Dinitro-2-methylphenol	8
	4-Aminobiphenyl	8
	4-Bromophenylphenyl ether	8
	4-Chloro-3-methylphenol	8
	4-Chloroaniline	8
	4-Chlorophenyl phenyl ether	8
	4-Nitroaniline	8
	4-Nitrophenol	8
	7,12-Dimethylbenz(a)-anthracene	8
	a,a-Dimethylphenethyl-amine	8
	Acenaphthene	8
	Acenaphthylene	8
	Acetophenone	8
	Aniline	8
	Azobenzene	8
	Benzidine	8
	Benzoic acid	8
	Benzyl alcohol	8
	bis(2-Chloroethoxy)methane	8
	bis(2-Chloroethyl) ether	8
	bis(2-Chloroisopropyl)ether	8
	Butyl benzyl phthalate	8
	Di-n-butyl phthalate	8
	Di-n-octyl phthalate	8
	Dibenz(a,j)acridine	8
	Dibenzofuran	8
	Diethyl phthalate	8
	Diphenylamine	8
	Ethyl methanesulfonate	8
	Fluorene	8
	Hexachlorobenzene	8
	Hexachlorobutadiene	8
	Hexachlorocyclopentadiene	8
	Hexachloroethane	8
	Isophorone	8
	Methyl methanesulfonate	8

TABLE 2-7

Chemicals Not Detected in Off-Base West Soldier Creek Sediments

Chemical Group	Chemical	Number of Samples
Semivolatile Organics	N-Nitroso-di-n-propylamine	8
(Continued)	N-Nitroso-di-n-butylamine	8
	N-Nitrosodiphenylamine	8
	N-Nitrosopiperidine	8
	Naphthalene	8
	Nitrobenzene	8
	p-Dimethylaminoazobenzene	8
	Pentachlorobenzene	8
	Pentachloronitrobenzene	8
	Pentachlorophenol	8
	Phenacetin	8
	Pronamide	8
Volatile Organics	1,1,1,2-Tetrachloroethane	6
	1,1,1-Trichloroethane	8
	1,1,2,2-Tetrachloroethane	6
	1,1,2-Trichloroethane	8
	1,1-Dichloroethane	8
	1,1-Dichloroethene	8
	1,2,3-Trichloropropane	8
	1,2-Dichloroethane	8
	1,2-Dichloropropane	8
	2-Chloroethyl vinyl ether	8
	2-Hexanone	8
	4-Methyl-2-pentanone (MIBK)	8
	Acrolein	8
	Acrylonitrile	8
	Benzene	8
	Bromodichloromethane	8
	Bromoform	8
	Bromomethane	8
	Carbon disulfide	8
	Carbon tetrachloride	8
	Chlorobenzene	8
	Chloroethane	8
	Chloroform	8
	Chloromethane	8
	cis-1,3-Dichloropropene	8
	Dibromochloromethane	8
	Dibromomethane	8
	Dichlorodifluoromethane	8
	Ethanol	8
	Ethyl methacrylate	8
	Ethylbenzene	8
	Iodomethane	8

TABLE 2-7

Chemicals Not Detected in Off-Base West Soldier Creek Sediments

Chemical Group	Chemical	Number of Samples
Volatile Organics	Styrene	8
(Continued)	Tetrachloroethene	8
	trans-1,3-Dichloropropene	8
	trans-1,4-Dichloro-2-butene	4
	trans-1,4-Dichloro-2-butene	4
	Trichloroethene	8
	Trichlorofluoromethane	8
	Vinyl acetate	8
	Vinyl chloride	8
	Xylenes (total)	8

TABLE 2-8

Chemicals Not Detected in On-Base East Soldier Creek Sediments

Chemical Group	Chemical	Number of Samples
PCB's/Chlorinated Pesticides	4,4'-DDD	61
	4,4'-DDE	61
	4,4'-DDT	61
	alpha-BHC	61
	alpha-Chlordane	61
	Aroclor 1016	61
	Aroclor 1221	61
	Aroclor 1232	61
	Aroclor 1242	61
	Aroclor 1248	61
	Aroclor 1260	61
	beta-BHC	61
	Dieldrin	61
	Endosulfan I	61
	Endosulfan II	61
	Endrin aldehyde	61
	gamma-BHC (Lindane)	61
	gamma-Chlordane	61
	Toxaphene	61
Semivolatile Organics	1,2,4,5-Tetrachloro-benzene	61
	1,2-Diphenylhydrazine	15
	1-Naphthylamine	61
	2,3,4,6-Tetrachlorophenol	61
	2,4,5-Trichlorophenol	76
	2,4,6-Trichlorophenol	76
	2,4-Dichlorophenol	76
	2,4-Dinitrophenol	76
	2,4-Dinitrotoluene	76
	2,6-Dichlorophenol	61
	2,6-Dinitrotoluene	61
	2-Naphthylamine	61
	2-Nitrophenol	76
	2-Picoline	61
	3,3'-Dichlorobenzidine	76
	3-Methylcholanthrene	61
	3-Nitroaniline	61
	3/4-Methylphenol	61
	4,6-Dinitro-2-methylphenol	76
	4-Aminobiphenyl	61
	4-Bromophenyl phenyl ether	76
	4-Chloro-3-methylphenol	76
	4-Chloroaniline	61
	4-Chlorophenyl phenyl ether	76
	4-Nitroaniline	61

TABLE 2-8

Chemicals Not Detected in On-Base East Soldier Creek Sediments

Chemical Group	Chemical	Number of Samples
Semivolatile Organics	4-Nitrophenol	76
(Continued)	7,12-Dimethylbenz(a)-anthracene	61
	a,a-Dimethylphenethyl-amine	61
	Aniline	61
	Azobenzene	61
	Benzyl alcohol	61
	bis(2-chloroethoxy) methane	15
	bis(2-Chloroethoxy) methane	61
	Bis(2-chloroethyl) ether	15
	bis(2-Chloroethyl) ether	61
	Bis(2-chloroisopropyl) ether	15
	bis(2-Chloroisopropyl) ether	61
	Di-n-octylphthalate	15
	Diethyl phthalate	76
	Diphenylamine	61
	Ethyl methanesulfonate	61
	Hexachlorobenzene	76
	Hexachlorobutadiene	76
	Hexachlorocyclopentadiene	76
	Hexachloroethane	76
	Methyl methanesulfonate	61
	N-Nitroso-di-n-butylamine	61
	N-Nitroso-di-n-propylamine	61
	N-nitrosodi-n-propylamine	15
	N-Nitrosopiperidine	61
	Nitrobenzene	76
	p-Dimethylaminoazobenzene	61
	Pentachlorobenzene	61
	Pentachloronitrobenzene	61
	Pentachlorophenol	76
	Phenacetin	61
	Phenol	76
	Pronamide	61
Volatile Organics	1,1,1,2-Tetrachloroethane	45
	1,1,1-Trichloroethane	76
	1,1,2-Trichloroethane	76
	1,1-Dichloroethane	76
	1,1-Dichloroethene	76
	1,2-Dichloropropane	76
	2-Chloroethyl vinyl ether	76
	Acrolein	76
	Acrylonitrile	76
	Bromodichloromethane	76
	Bromoform	76

TABLE 2-8

Chemicals Not Detected in On-Base East Soldier Creek Sediments

Chemical Group	Chemical	Number of Samples
Volatile Organics	Bromomethane	76
(Continued)	Carbon tetrachloride	76
	Chloroethane	76
	Cis-1,2-dichloroethene	15
	Cis-1,3-dichloropropene	15
	cis-1,3-Dichloropropene	61
	Dibromochloromethane	76
	Dibromomethane	61
	Dichlorodifluoromethane	76
	Ethanol	61
	Ethyl methacrylate	61
	Iodomethane	61
	Styrene	61
	Tetrachloroethylene	15
	Toluene-D8	15
	trans-1,2-Dichloroethene	61
	Trans-1,3-dichloropropene	15
	trans-1,3-Dichloropropene	61
	Trichlorofluoromethane	76
	Vinyl acetate	61
	Vinyl chloride	76

TABLE 2-9

Chemicals Not Detected in Off-Base East Soldier Creek Sediments

Chemical Group	Chemical	Number of Samples
PCB's/Chlorinated Pesticides	4,4'-DDD	19
	4,4'-DDE	19
	4,4'-DDT	19
	Aroclor 1016	19
	Aroclor 1221	19
	Aroclor 1232	19
	Aroclor 1242	19
	Aroclor 1248	19
	Aroclor 1260	19
	beta-BHC	19
	delta-BHC	19
	Dieldrin	19
	Endosulfan I	19
	Endosulfan II	19
	Endosulfan sulfate	19
	Endrin	19
	Endrin aldehyde	19
	gamma-BHC (Lindane)	19
	gamma-Chlordane	19
	Heptachlor epoxide	19
	Methoxychlor	19
	Toxaphene	19
Semivolatile Organics	1,2-Diphenylhydrazine	10
	4-Methylphenol	10
	bis(2-chloroethoxy) methane	10
	Bis(2-chloroethyl) ether	10
	Bis(2-chloroisopropyl) ether	10
	Di-n-octylphthalate	10
	N-nitrosodi-n-propylamine	10
	1,2,4,5-Tetrachloro-benzene	19
	1-Naphthylamine	19
	2,3,4,6-Tetrachlorophenol	19
	2,6-Dichlorophenol	19
	2,6-Dinitrotoluene	19
	2-Naphthylamine	19
	2-Picoline	19
	3-Methylcholanthrene	19
	3-Nitroaniline	19
	4-Aminobiphenyl	19
	4-Chloroaniline	19
	4-Nitroaniline	19
	7,12-Dimethylbenz(a)-anthracene	19
	a,a-Dimethylphenethyl-amine	19
	Acetophenone	19
	Aniline	19
	Azobenzene	19
	Benzoic acid	19

TABLE 2-9

Chemicals Not Detected in Off-Base East Soldier Creek Sediments

Chemical Group	Chemical	Number of Samples
Semivolatile Organics	Benzyl alcohol	19
(Continued)	bis(2-Chloroethoxy) methane	19
	bis(2-Chloroethyl) ether	19
	bis(2-Chloroisopropyl) ether	19
	Dibenz(a,j)acridine	19
	Diphenylamine	19
	Ethyl methanesulfonate	19
	Methyl methanesulfonate	19
	N-Nitroso-di-n-butylamine	19
	N-Nitroso-di-n-propylamine	19
	N-Nitrosopiperidine	19
	p-Dimethylaminoazobenzene	19
	Pentachlorobenzene	19
	Pentachloronitrobenzene	19
	Phenacetin	19
	Pronamide	19
	Benzidine	20
	1,2,4-Trichlorobenzene	29
	1,3-Dichlorobenzene	29
	2,4,5-Trichlorophenol	29
	2,4,6-Trichlorophenol	29
	2,4-Dichlorophenol	29
	2,4-Dimethylphenol	29
	2,4-Dinitrophenol	29
	2,4-Dinitrotoluene	29
	2-Chlorophenol	29
	2-Methylphenol	29
	2-Nitrophenol	29
	3,3'-Dichlorobenzidine	29
	4,6-Dinitro-2-methylphenol	29
	4-Bromophenyl phenyl ether	29
	4-Chloro-3-methylphenol	29
	4-Chlorophenyl phenyl ether	29
	4-Nitrophenol	29
	Acenaphthylene	29
	Dimethyl phthalate	29
	Hexachlorobenzene	29
	Hexachlorobutadiene	29
	Hexachlorocyclopentadiene	29
	Hexachloroethane	29
	Isophorone	29
	Nitrobenzene	29
	Pentachlorophenol	29
	Phenol	29
Volatile Organics	1,2,4-Trimethylbenzene	10
	1,3-Dichlorobenzene	10
	Cis-1,2-dichloroethene	10

TABLE 2-9

Chemicals Not Detected in Off-Base East Soldier Creek Sediments

Chemical Group	Chemical	Number of Samples
Volatile Organics	Cis-1,3-dichloropropene	10
(Continued)	Tetrachloroethylene	10
	Toluene-D8	10
	Trans-1,3-dichloropropene	10
	1,1,1,2-Tetrachloroethane	13
	1,2,3-Trichloropropane	19
	2-Hexanone	19
	4-Methyl-2-pentanone (MIBK)	19
	cis-1,3-Dichloropropene	19
	Dibromomethane	19
	Ethanol	19
	Ethyl methacrylate	19
	Iodomethane	19
	Styrene	19
	Tetrachloroethene	19
	trans-1,2-Dichloroethene	19
	trans-1,3-Dichloropropene	19
	trans-1,4-Dichloro-2-butene	19
	Vinyl acetate	19
	1,1,2,2-Tetrachloroethane	26
	1,1,1-Trichloroethane	29
	1,1,2-Trichloroethane	29
	1,1-Dichloroethane	29
	1,1-Dichloroethene	29
	1,2-Dichloroethane	29
	1,2-Dichloropropane	29
	2-Chloroethyl vinyl ether	29
	Benzene	29
	Bromodichloromethane	29
	Bromoform	29
	Bromomethane	29
	Carbon tetrachloride	29
	Chloroethane	29
	Chloroform	29
	Chloromethane	29
	Dibromochloromethane	29
	Dichlorodifluoromethane	29
	Ethylbenzene	29
	Trichloroethene	29
	Trichlorofluoromethane	29
	Vinyl chloride	29
	Xylenes (total)	29

TABLE 2-10

CHEMICALS DETECTED AT LOW FREQUENCY AND CONCENTRATION ON-BASE EAST SOLDIER CREEK SURFACE WATER

Group	Chemical	Max conc (mg/L)	Frequency
Metals	Cadmium	0.0061	1/36
	Cobalt	0.0066	1/36
	Mercury	0.0001	1/36
Semivolatile Organics	3/4-Methylphenol	0.0013	1/36
	Diethyl phthalate	0.0012	1/36
	Phenanthrene	0.0016	1/36
Volatile Organics	Tetrachloroethene	0.0012	1/36

TABLE 2-11

CHEMICALS DETECTED AT LOW FREQUENCY AND CONCENTRATION ON-BASE WEST SOLDIER CREEK SEDIMENTS

Group	Chemical	Max conc (mg/kg)	Frequency
Semivolatile Organics	Acenaphthylene	0.044	1/38
	Acetophenone	0.13	1/38
	Benzoic acid	0.071	1/38
	Di-n-octyl phthalate	0.093	1/38
	Dibenz(a,j)acridine	0.089	1/38
	Pentachlorophenol	0.055	1/38
Volatile Organics	Benzene	0.0016	1/38
	Ethylbenzene	0.035	1/38
	Xylenes (total)	0.084	1/38

TABLE 2-12

CHEMICALS DETECTED AT LOW FREQUENCY AND CONCENTRATION ON-BASE EAST SOLDIER CREEK SEDIMENTS

Group	Chemical	Max conc (mg/kg)	Frequency
Metals	Thallium	0.38	1/76
Chlorinated Pesticides	Endosulfan sulfate	0.041	2/61
	Endrin	0.002	2/61
	Heptachlor epoxide	0.21	2/61
	Methoxychlor	0.019	2/61
Semivolatile Organics	2,4-Dimethylphenol	0.066	1/76
	2-Chlorophenol	0.084	2/76
	2-Methylphenol	0.008	1/76
	Acetophenone	0.085	1/61
	Dibenz(a,j)acridine	1.4	1/61
	Isophorone	0.098	2/76
	N-Nitrosodiphenylamine	0.15	1/76
Volatile Organics	1,1,2,2-Tetrachloroethane	0.0026	2/62
	1,2,3-Trichloropropane	0.0017	1/61
	1,2-Dichloroethane	0.0068	3/76
	2-Hexanone	0.014	1/61
	4-Methyl-2-pentanone (MIBK)	0.005	1/61
	Chloroform	0.0025	1/76
	Chloromethane	0.0018	1/76
	Trichloroethene	0.0019	2/76
	trans-1,4-Dichloro-2-butene	0.0012	1/61

TABLE 2-13

CHEMICALS DETECTED AT LOW FREQUENCY AND CONCENTRATION OFF-BASE EAST SOLDIER CREEK SEDIMENTS

Group	Chemical	Max conc (mg/kg)	Frequency
Semivolatile Organics	1,2-Dichlorobenzene	0.13	1/29
	1,4-Dichlorobenzene	0.046	1/29
	Butyl benzyl phthalate	0.036	1/29
	Dibenz(a,h)anthracene	0.2	1/29
	Diethyl phthalate	0.011	1/29
	Fluorene	0.44	1/29
	N-Nitrosodiphenylamine	0.05	1/29
	Naphthalene	4.9	1/29
Volatile Organics	Acrolein	0.01	1/29

TABLE 2-14

ESSENTIAL NUTRIENTS EXCLUDED AS POTENTIAL COCS ON-BASE WEST SOLDIER CREEK SURFACE WATER

Chemical	Surface Water Concentration[a] (mg/L)	Daily Ingestion[b] (mg/day)	RDA[c] (mg/day)
Calcium	51.1	25.55	1200
Chromium	0.011	0.0055	0.2
Copper	0.019	0.0095	3
Iron	3.4	1.7	30
Magnesium	9.3	4.65	400
Manganese	0.44	0.22	5
Molybdenum	0.077	0.0385	0.25
Potassium	0.33	0.165	390-780[d]
Sodium	3.8	1.9	1000[e]
Selenium	0.0036	0.0018	0.075
Zinc	0.068	0.034	15

Note:

a. Maximum detected concentration.

b. Assumes an individual who ingests 0.5 L/day of surface water.

c. Recommended Daily Allowance established by the National Research Council (1989).

d. Recommended Potassium intake is based on body weight. For a small child weighing 10kg, the recommended daily intake is 390-780 mg/day.

e. Sodium is recognized as an essential nutrient, but there is no RDA value. Ingestion of less than 1,000 mg/day is considered a sodium-restricted diet. The average dietary intake of sodium in the U.S. is greater than 10,000 mg/day (Nelson, 1992).

TABLE 2-15

ESSENTIAL NUTRIENTS EXCLUDED AS POTENTIAL COCS OFF-BASE WEST SOLDIER CREEK SURFACE WATER

Chemical	Surface Water Concentration[a] (mg/L)	Daily Ingestion[b] (mg/day)	RDA[c] (mg/day)
Calcium	73.7	36.85	1200
Copper	0.019	0.0095	3
Iron	0.26	0.13	30
Magnesium	32.6	16.3	400
Manganese	0.093	0.0465	5
Molybdenum	0.48	0.24	0.25
Potassium	3.1	1.55	390-780[d]
Sodium	66.4	33.2	1000[e]
Zinc	0.026	0.013	15

Note:

a. Maximum detected concentration.

b. Assumes an individual who ingests 0.5 L/day of surface water.

c. Recommended Daily Allowance established by the National Research Council (1989).

d. Recommended Potassium intake is based on body weight. For a small child weighing 10kg, the recommended daily intake is 390-780 mg/day.

e. Sodium is recognized as an essential nutrient, but there is no RDA value. Ingestion of less than 1,000 mg/day is considered a sodium-restricted diet The average dietary intake of sodium in the U.S. is greater than 10,000 mg/day (Nelson, 1992).

TABLE 2-16

ESSENTIAL NUTRIENTS EXCLUDED AS POTENTIAL COCS ON-BASE EAST SOLDIER CREEK SURFACE WATER

Chemical	Surface Water Concentration[a] (mg/L)	Daily Ingestion[b] (mg/day)	RDA[c] (mg/day)
Calcium	99.6	49.8	1200
Chromium	0.52	0.26	0.2
Copper	0.3	0.15	3
Iron	1.3	0.65	30
Magnesium	45.7	22.85	400
Manganese	0.2	0.1	5
Phosphorus	0.57	0.285	1200
Potassium	5.7	2.85	390-780[d]
Sodium	125	62.5	1000[e]
Selenium	0.0041	0.00205	0.075
Zinc	0.043	0.0215	15

Note:

a. Maximum detected concentration.

b. Assumes an individual who ingests 0.5 L/day of surface water.

c. Recommended Daily Allowance established by the National Research Council (1989).

d. Recommended Potassium intake is based on body weight. For a small child weighing 10kg, the recommended daily intake is 390-780 mg/day.

e. Sodium is recognized as an essential nutrient, but there is no RDA value. Ingestion of less than 1,000 mg/day is considered a sodium-restricted diet. The average dietary intake of sodium in the U.S. is greater than 10,000 mg/day (Nelson, 1992).

TABLE 2-17

ESSENTIAL NUTRIENTS EXCLUDED AS POTENTIAL COCS
OFF-BASE EAST SOLDIER CREEK SURFACE WATER

Chemical	Surface Water Concentration[a] (mg/L)	Daily Ingestion[b] (mg/day)	RDA[c] (mg/day)
Calcium	62.5	31.25	1200
Chromium	0.18	0.09	0.2
Copper	0.026	0.013	3
Iron	0.45	0.225	30
Magnesium	30.6	15.3	400
Manganese	0.22	0.11	5
Molybdenum	0.066	0.033	0.25
Potassium	5.7	2.85	390-780[d]
Sodium	203	101.5	1000[e]
Selenium	0.0041	0.00205	0.075
Zinc	0.037	0.0185	15

Note:

a. Maximum detected concentration.

b. Assumes an individual who ingests 0.5 L/day of surface water.

c. Recommended Daily Allowance established by the National Research Council (1989).

d. Recommended Potassium intake is based on body weight. For a small child weighing 10kg, the recommended daily intake is 390-780 mg/day.

e. Sodium is recognized as an essential nutrient, but there is no RDA value. Ingestion of less than 1,000 mg/day is considered a sodium-restricted diet. The average dietary intake of sodium in the U.S. is greater than 10,000 mg/day (Nelson, 1992).

TABLE 2-18

ESSENTIAL NUTRIENTS EXCLUDED AS POTENTIAL COCS ON-BASE WEST SOLDIER CREEK SEDIMENTS

Chemical	Sediment Concentration[a] (mg/kg)	Daily Ingestion[b] (mg/day)	RDA[c] (mg/day)
Calcium	97300	9.73	1200
Copper	650	0.065	3
Iron	28500	2.85	30
Magnesium	22200	2.22	400
Manganese	4250	0.425	5
Molybdenum	62.6	0.00626	0.25
Potassium	4880	0.488	390-780[d]
Sodium	1890	0.189	1000[e]
Selenium	12	0.0012	0.075
Zinc	1790	0.179	15

Note:

a. Maximum detected concentration.

b. Assumes an individual who ingests 100 mg/day of sediment per day.

c. Recommended Daily Allowance established by the National Research Council (1989).

d. Recommended Potassium intake is based on body weight. For a small child weighing 10kg, the recommended daily intake is 390-780 mg/day.

e. Sodium is recognized as an essential nutrient, but there is no RDA value. Ingestion of less than 1,000 mg/day is considered a sodium-restricted diet. The average dietary intake of sodium in the U.S. is greater than 10,000 mg/day (Nelson, 1992).

TABLE 2-19

ESSENTIAL NUTRIENTS EXCLUDED AS POTENTIAL COCS OFF-BASE WEST SOLDIER CREEK SEDIMENTS

Chemical	Sediment Concentration[a] (mg/kg)	Daily Ingestion[b] (mg/day)	RDA[c] (mg/day)
Calcium	116000	11.6	1200
Chromium	205	0.0205	0.2
Copper	2210	0.221	3
Iron	13900	1.39	30
Magnesium	12900	1.29	400
Manganese	820	0.082	5
Molybdenum	24.4	0.00244	0.25
Potassium	1650	0.165	390-780[d]
Sodium	255	0.0255	1000[e]
Selenium	0.3	0.00003	0.075
Zinc	890	0.089	15

Note:

a. Maximum detected concentration.

b. Assumes an individual who ingests 100 mg/day of sediment per day.

c. Recommended Daily Allowance established by the National Research Council (1989).

d. Recommended Potassium intake is based on body weight. For a small child weighing 10kg, the recommended daily intake is 390-780 mg/day.

e. Sodium is recognized as an essential nutrient, but there is no RDA value. Ingestion of less than 1,000 mg/day is considered a sodium-restricted diet. The average dietary intake of sodium in the U.S. is greater than 10,000 mg/day (Nelson, 1992).

TABLE 2-20

ESSENTIAL NUTRIENTS EXCLUDED AS POTENTIAL COCS ON-BASE EAST SOLDIER CREEK SEDIMENTS

Chemical	Sediment Concentration[a] (mg/kg)	Daily Ingestion[b] (mg/day)	RDA[c] (mg/day)
Calcium	210000	21	1200
Chromium	2040	0.204	0.2
Copper	583	0.0583	3
Iron	26600	2.66	30
Magnesium	22800	2.28	400
Manganese	2030	0.203	5
Molybdenum	56.4	0.00564	0.25
Potassium	2060	0.206	390-780[d]
Sodium	1090	0.109	1000[e]
Selenium	3	0.0003	0.075
Zinc	512	0.0512	15

Note:

a. Maximum detected concentration.

b. Assumes an individual who ingests 100 mg/day of sediment per day.

c. Recommended Daily Allowance established by the National Research Council (1989).

d. Recommended Potassium intake is based on body weight. For a small child weighing 10kg, the recommended daily intake is 390-780 mg/day.

e. Sodium is recognized as an essential nutrient, but there is no RDA value. Ingestion of less than 1,000 mg/day is considered a sodium-restricted diet. The average dietary intake of sodium in the U.S. is greater than 10,000 mg/day (Nelson, 1992).

TABLE 2-21

ESSENTIAL NUTRIENTS EXCLUDED AS POTENTIAL COCS
OFF-BASE EAST SOLDIER CREEK SEDIMENTS

Chemical	Sediment Concentration[a] (mg/kg)	Daily Ingestion[b] (mg/day)	RDA[c] (mg/day)
Calcium	63200	6.32	1200
Chromium	831	0.0831	0.2
Copper	43.7	0.00437	3
Iron	19800	1.98	30
Magnesium	30600	3.06	400
Manganese	1930	0.193	5
Molybdenum	7.2	0.00072	0.25
Potassium	1750	0.175	390-780[d]
Sodium	666	0.0666	1000[e]
Selenium	0.31	0.000031	0.075
Zinc	268	0.0268	15

Note:

a. Maximum detected concentration.

b. Assumes an individual who ingests 100 mg/day of sediment per day.

c. Recommended Daily Allowance established by the National Research Council (1989).

d. Recommended Potassium intake is based on body weight. For a small child weighing 10kg, the recommended daily intake is 390-780 mg/day.

e. Sodium is recognized as an essential nutrient, but there is no RDA value. Ingestion of less than 1,000 mg/day is considered a sodium-restricted diet. The average dietary intake of sodium in the U.S. is greater than 10,000 mg/day (Nelson, 1992).

TABLE 2-22

CHEMICALS DETECTED AT BACKGROUND LEVELS ON-BASE WEST SOLDIER CREEK SURFACE WATER

Chemical	Background Concentration[a] (mg/L)	2 x Background Concentration (mg/L)	Maximum Detected Concentration (mg/L)
Aluminum	4.4	8.7	4.3
Barium	0.74	1.5	0.33
Manganese	1.6	3.2	0.44
Zinc	0.12	0.24	0.068
Copper	0.048	0.096	0.019
Lead	0.012	0.024	0.0066

Note: a. Samples taken from upper stream, off-base Crutcho Creek were used to identify background concentrations

TABLE 2-23

CHEMICALS DETECTED AT BACKGROUND LEVELS OFF-BASE WEST SOLDIER CREEK SURFACE WATER

Chemical	Background Concentration[a] (mg/L)	2 x Background Concentration (mg/L)	Maximum Detected Concentration (mg/L)
Aluminum	4.4	8.7	0.10
Barium	0.74	1.5	0.38
Iron	3.0	5.9	0.26
Manganese	1.6	3.2	0.093
Zinc	0.12	0.24	0.026
Copper	0.048	0.096	0.019
Lead	0.012	0.024	0.0034

Note: a. Samples taken from upper stream, off-base Crutcho Creek were used to identify background concentrations

TABLE 2-24

CHEMICALS DETECTED AT BACKGROUND LEVELS ON-BASE EAST SOLDIER CREEK SURFACE WATER

Chemical	Background Concentration[a] (mg/L)	2 x Background Concentration (mg/L)	Maximum Detected Concentration (mg/L)
Aluminum	4.4	8.7	0.7
Barium	0.74	1.5	0.68
Iron	3.0	5.9	1.3
Zinc	0.12	0.24	0.043
Copper	0.048	0.096	0.30
Lead	0.012	0.024	0.030

Note: a. Samples taken from upper stream, off-base Crutcho Creek were used to identify background concentrations

TABLE 2-25

CHEMICALS DETECTED AT BACKGROUND LEVELS OFF-BASE EAST SOLDIER CREEK SURFACE WATER

Chemical	Background Concentration[a] (mg/L)	2 x Background Concentration (mg/L)	Maximum Detected Concentration (mg/L)
Aluminum	4.4	8.7	0.33
Barium	0.74	1.5	0.48
Iron	3.0	5.9	0.45
Manganese	1.6	3.2	0.22
Zinc	0.12	0.24	0.037
Copper	0.048	0.096	0.026
Lead	0.012	0.024	0.0025

Note: a. Samples taken from upper stream, off-base Crutcho Creek were used to identify background concentrations

TABLE 2-26

CHEMICALS DETECTED AT BACKGROUND LEVELS ON-BASE WEST SOLDIER CREEK SEDIMENTS

Chemical	Background Concentration[a] (mg/kg)	2 x Background Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)
Aluminum	17,000	34,000	23,000
Arsenic	14	28	7
Barium	2,600	5,200	4,700
Iron	71,000	142,000	28,500
Manganese	7,500	15,000	4,250

Note: a. Samples taken from upper stream, off-base Crutcho Creek were used to identify background concentrations

TABLE 2-27

CHEMICALS DETECTED AT BACKGROUND LEVELS OFF-BASE WEST SOLDIER CREEK SEDIMENTS

Chemical	Background Concentration[a] (mg/kg)	2 x Background Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)
Aluminum	17,000	34,000	9,910
Arsenic	14	28	9
Barium	2,600	5,200	3,850
Cadmium	7	15	8
Iron	71,000	142,000	13,900
Manganese	7,500	15,000	820
Selenium	1	2	0.3
Silver	7	14	3.6

Note: a. Samples taken from upper stream, off-base Crutcho Creek were used to identify background concentrations

TABLE 2-28

CHEMICALS DETECTED AT BACKGROUND LEVELS ON-BASE EAST SOLDIER CREEK SEDIMENTS

Chemical	Background Concentration[a] (mg/kg)	2 x Background Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)
Aluminum	17,000	34,000	16,000
Arsenic	14	28	11
Barium	2,600	5,200	2,500
Iron	71,000	142,000	26,600
Manganese	7,540	15,080	2,030

Note: a. Samples taken from upper stream, off-base Crutcho Creek were used to identify background concentrations

TABLE 2-29

CHEMICALS DETECTED AT BACKGROUND LEVELS OFF-BASE EAST SOLDIER CREEK SEDIMENTS

Chemical	Background Concentration[a] (mg/kg)	2 x Background Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)
Aluminum	17,000	34,000	12,600
Arsenic	14	28	8
Barium	260	520	1,860
Copper	56	112	44
Iron	71,000	142,000	19,800
Manganese	7,500	15,000	1,930
Selenium	1.0	2.0	0.31

Note: a. Samples taken from upper stream, off-base Crutcho Creek were used to identify background concentrations

TABLE 2-30

CHEMICALS OF CONCERN
ON-BASE WEST SOLDIER CREEK SURFACE WATER

Chemical	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)	Frequency of Detection
Metals			
Arsenic	0.0035	0.001	5/7
Cobalt	0.031	0.004	3/7
Nickel	0.33	0.018	6/7
Vanadium	0.013	0.0072	2/7
Semivolatile Organics			
3/4-Methylphenol	0.0017	0.0017	1/7
N-Nitroso-di-n-propylamine	0.0018	0.0018	1/7
Phenol	0.0014	0.0014	1/7
Volatile Organics			
Acetone	0.0067	0.0046	2/7
Chlorobenzene	0.0018	0.0018	1/7
Methylene chloride	0.0026	0.0011	4/7
Tetrachloroethene	0.011	0.002	5/7
Toluene	0.0017	0.0017	1/7
Trichloroethene	0.014	0.0014	4/7
Vinyl chloride	0.001	0.001	1/7

TABLE 2-31

CHEMICALS OF CONCERN
OFF-BASE WEST SOLDIER CREEK SURFACE WATER

Chemical	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)	Frequency of Detection
Metals			
Arsenic	0.0018	0.001	3/8
Thallium	0.0011	0.0011	1/8
Vanadium	0.014	0.0059	6/8
Volatile Organics			
Carbon disulfide	0.001	0.001	1/8
Methylene chloride	0.0027	0.0011	5/8

TABLE 2-32

CHEMICALS OF CONCERN
ON-BASE EAST SOLDIER CREEK SURFACE WATER

Chemical	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)	Frequency of Detection
Metals			
Arsenic	0.0033	0.001	23/36
Molybdenum	0.57	0 023	28/36
Nickel	0.093	0.01	8/36
Vanadium	0.03	0.0067	34/36
Chlorinated Pesticides			
Aldrin	0.0001	0.000047	2/36
Semivolatile Organics			
4-Nitrophenol	0.002	0.0012	5/36
Benzoic acid	0.0039	0.0013	5/36
Benzyl alcohol	0.0017	0.001	3/36
bis(2-Ethylhexyl)phthalate	0.0046	0.0009	5/36
Fluoranthene	0.0015	0.0012	2/36
Phenol	0.0035	0.0012	5/36
Volatile Organics			
2-Butanone (MEK)	0.0028	0.0017	2/36
Acetone	0.012	0.0053	13/36
Bromoform	0.0026	0.0013	9/36
Chloroform	0.0018	0.0014	2/36
Methylene chloride	0.15	0.0012	23/36
Toluene	0.0014	0.0011	2/36

TABLE 2-33

CHEMICALS OF CONCERN
OFF-BASE EAST SOLDIER CREEK SURFACE WATER

Chemical	Maximum Detected Concentration (mg/L)	Minimum Detected Concentration (mg/L)	Frequency of Detection
Metals			
Arsenic	0.0014	0.0012	4/8
Cadmium	0.0036	0.0036	1/8
Cobalt	0.0068	0.0068	1/8
Nickel	0.08	0.0095	3/8
Thallium	0.0012	0.0012	1/8
Vanadium	0.011	0.0053	6/8
Chlorinated Pesticides			
Aldrin	0.0001	0.000032	2/8
Semivolatile Organics			
bis(2-Ethylhexyl)phthalate	0.0036	0.0014	3/8
Phenol	0.0012	0.001	3/8
Volatile Organics			
Acetone	0.0061	0.0052	3/8
Methylene chloride	0.051	0.001	8/8

TABLE 2-34

CHEMICALS OF CONCERN
ON-BASE WEST SOLDIER CREEK SEDIMENTS

Chemical	Maximum Detected Concentration (mg/kg)	Minimum Detected Concentration (mg/kg)	Frequency of Detection
Metals			
Antimony	7.5	6.2	4/38
Beryllium	1.9	0.35	38/38
Cadmium	132	0.69	31/38
Chromium	3210	11.6	38/38
Cobalt	126	2.8	38/38
Lead	746	6.8	37/38
Mercury	0.9	0.094	11/38
Nickel	3160	15	38/38
Silver	205	0.55	25/38
Thallium	0.2	0.12	8/38
Vanadium	95.7	13	38/38
PCBs/Pesticides			
Aldrin	0.011	0.0088	3/38
Aroclor 1254	33	0.038	28/38
Semivolatile organics			
1,2-Dichlorobenzene	0.57	0.048	8/38
1,4-Dichlorobenzene	0.21	0.06	5/38
2,4-Dimethylphenol	0.35	0.05	5/38
2-Methylnaphthalene	0.15	0.042	5/38
3/4-Methylphenol	0.22	0.046	5/38
Acenaphthene	0.46	0.041	11/38
Anthracene	0.85	0.05	18/38
Benzidine	0.43	0.16	2/38
Benzo(a)anthracene	3.1	0.043	29/38
Benzo(a)pyrene	3.2	0.049	29/38
Benzo(b)fluoranthene	6.6	0.04	32/38
Benzo(g,h,i)perylene	1.9	0.061	26/38
Benzo(k)fluoranthene	2.4	0.068	9/38
bis(2-Ethylhexyl)phthalate	8	0.089	28/38
Butyl benzyl phthalate	0.37	0.18	2/38
Chrysene	5	0.04	33/38
Di-n-butyl phthalate	0.15	0.15	2/38
Dibenz(a,h)anthracene	0.75	0.069	7/38
Dibenzofuran	0.36	0.056	5/38
Dimethyl phthalate	0.075	0.039	4/38
Fluoranthene	6.7	0.044	34/38
Fluorene	0.57	0.06	11/38
Indeno(1,2,3-cd)pyrene	1.7	0.044	26/38
Naphthalene	0.45	0.078	7/38
Phenanthrene	5.2	0.052	27/38
Pyrene	6.8	0.044	34/38
Volatile Organics			
2-Butanone (MEK)	0.026	0.0021	10/38
Acetone	0.13	0.0046	20/38
Carbon disulfide	0.011	0.0018	3/38
Chlorobenzene	0.1	0.0018	5/38
Chloromethane	0.0033	0.0033	2/38
Methylene chloride	0.024	0.0013	34/38
Tetrachloroethene	0.016	0.0055	3/38
Toluene	0.018	0.0016	14/38
Trichloroethene	0.077	0.0019	5/38
Vinyl chloride	0.015	0.013	3/38

TABLE 2-35

CHEMICALS OF CONCERN
OFF-BASE WEST SOLDIER CREEK SEDIMENTS

Chemical	Maximum Detected Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	Frequency of Detection
Metals			
Antimony	8.1	7.9	2/8
Beryllium	0.79	0.23	5/8
Cobalt	10.2	2	8/8
Lead	4400	9.7	8/8
Mercury	0.12	0.12	1/8
Nickel	274	13.2	8/8
Vanadium	26.7	5.4	8/8
PCBs/Pesticides			
Aldrin	0.045	0.045	1/8
Aroclor 1254	1.7	0.22	7/8
delta-BHC	0.0012	0.0012	1/8
Semivolatile organics			
Anthracene	0.075	0.075	1/8
Benzo(a)anthracene	3.5	0.054	3/8
Benzo(a)pyrene	2.1	0.067	3/8
Benzo(b)fluoranthene	0.92	0.048	4/8
Benzo(g,h,i)perylene	0.62	0.05	3/8
Benzo(k)fluoranthene	5.3	5.3	1/8
bis(2-Ethylhexyl)phthalate	4.9	0.087	7/8
Chrysene	3.7	0.051	4/8
Dibenz(a,h)anthracene	0.17	0.12	2/8
Dimethyl phthalate	0.045	0.045	1/8
Fluoranthene	5.3	0.044	6/8
Indeno(1,2,3-cd)pyrene	0.6	0.045	3/8
Phenanthrene	0.93	0.042	3/8
Phenol	0.063	0.063	1/8
Pyrene	6.4	0.047	5/8
Volatile Organics			
Acetone	0.03	0.0037	3/8
Methylene chloride	0.0035	0.0013	7/8
Toluene	0.0022	0.0022	1/8
trans-1,2-Dichloroethene	0.0015	0.0015	1/8

TABLE 2-36

CHEMICALS OF CONCERN
ON-BASE EAST SOLDIER CREEK SEDIMENTS

Chemical	Maximum Detected Concentration (mg/kg)	Minimum Detected Concentration (mg/kg)	Frequency of Detection
Metals			
Antimony	22	5.4	12/66
Beryllium	0.96	0.07	48/76
Cadmium	415	0.21	73/76
Cobalt	56.7	1.3	56/61
Lead	480	7.8	68/71
Mercury	3.5	0.06	59/76
Nickel	1220	1.7	75/76
Silver	130	0.36	52/76
Vanadium	48.7	1.8	61/61
PCBs/Pesticides			
Aldrin	0.84	0.0011	30/61
Aroclor 1254	40	0.07	40/61
delta-BHC	0.37	0.034	5/61
Heptachlor	52	0.002	32/61
Semivolatile organics			
1,2,4-Trichlorobenzene	0.43	0.008	4/76
1,2-Dichlorobenzene	3.7	0.01	9/76
1,3-Dichlorobenzene	3	0.008	6/76
1,4-Dichlorobenzene	33	0.076	7/76
1-Chloronaphthalene	5.2	0.054	15/61
2-Chloronaphthalene	1.4	0.062	12/76
2-Methylnaphthalene	1.2	0.044	12/61
4-Methylphenol	0.019	0.019	1/15
Acenaphthene	8	0.048	36/61
Acenaphthylene	3.9	0.002	7/76
Anthracene	26	0.016	51/76
Benzidien	370	7.5	2/64
Benzo(a)anthracene	39	0.042	61/76
Benzo(a)pyrene	26	0.02	63/76
Benzo(b)fluoranthene	33	0.011	65/76
Benzo(g,h,i)perylene	17	0.02	53/76
Benzo(k)fluoranthene	39	0.011	17/76
Benzoic acid	0.17	0.041	5/61
bis(2-Ethylhexyl)phthalate	23	0.044	73/76
Butyl benzyl phthalate	6	0.03	8/76
Chrysene	35	0.024	70/76
Di-n-butyl phthalate	4.6	0.01	12/76
Di-n-octyl phthalate	11	0.057	9/61
Dibenz(a,h)anthracene	10	0.054	21/76
Dibenzofuran	5.5	0.046	28/61
Dimethyl phthalate	0.66	0.41	4/76
Fluoranthene	53	0.021	73/76
Fluorene	12	0.009	42/76
Indeno(1,2,3-cd)pyrene	19	0.088	51/76
Naphthalene	5.9	0.05	34/76
Phenanthrene	58	0.057	70/76
Pyrene	55	0.012	74/76
Volatile Organics			
2-Butanone (MEK)	2.9	0.0019	25/61
Acetone	0.95	0.0025	44/61
Benzene	0.0056	0.0015	4/76
Carbon disulfide	0.011	0.0012	12/61
Chlorobenzene	1500	0.0014	40/76
Ethylbenzene	0.013	0.0023	6/76
Methylene chloride	0.6	0.0016	44/76
Tetrachloroethene	0.017	0.0014	6/61
Toluene	0.073	0.0013	25/76
Xylenes (total)	12	0.0017	13/76

TABLE 2-37

CHEMICALS OF CONCERN
OFF-BASE EAST SOLDIER CREEK SEDIMENTS

Chemical	Maximum Detected Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	Frequency of Detection
Metals			
Antimony	4.5	4.5	1/19
Beryllium	0.6	0.13	26/29
Cadmium	123	0.25	17/29
Cobalt	14.6	2.6	19/19
Lead	107	0.7	25/29
Mercury	0.6	0.081	13/29
Nickel	347	1	29/29
Silver	19.4	0.99	9/29
Thallium	9	0.15	2/29
Vanadium	25.1	8.4	19/19
PCBs/Pesticides			
Aldrin	0.086	0.0053	6/19
alpha-BHC	0.002	0.0017	2/19
alpha-Chlordane	0.91	0.91	1/19
Aroclor 1254	9.7	0.074	11/19
Heptachlor	0.97	0.0017	10/19
Semivolatile organics			
1-Chloronaphthalene	1.3	0.076	2/19
2-Chloronaphthalene	0.069	0.051	2/29
2-Methylnaphthalene	0.11	0.11	1/19
3/4-Methylphenol	0.16	0.16	1/19
Acenaphthene	0.54	0.54	1/19
Anthracene	0.79	0.053	2/29
Benzo(a)anthracene	1.5	0.041	5/29
Benzo(a)pyrene	1.3	0.046	5/29
Benzo(b)fluoranthene	2.3	0.068	5/29
Benzo(g,h,i)perylene	0.6	0.59	2/29
Benzo(k)fluoranthene	0.67	0.046	3/29
bis(2-Ethylhexyl)phthalate	4.5	0.021	19/29
Chrysene	2.1	0.06	7/29
Di-n-butyl phthalate	0.034	0.011	10/29
Di-n-octyl phthalate	0.077	0.049	2/19
Dibenzofuran	0.27	0.27	1/19
Fluoranthene	4.4	0.009	13/29
Indeno(1,2,3-cd)pyrene	0.63	0.46	2/29
Phenanthrene	4.6	0.047	4/29
Pyrene	3.6	0.006	11/29
Volatile Organics			
2-Butanone (MEK)	0.015	0.0032	9/19
Acetone	0.07	0.0095	13/19
Acrylonitrile	0.0045	0.0022	2/29
Carbon disulfide	0.021	0.0026	5/19
Chlorobenzene	0.007	0.0019	5/29
Methylene chloride	0.0085	0.0014	11/29
Toluene	1.1	0.037	3/29

3.0
EXPOSURE ASSESSMENT

The purpose of the exposure assessment is to estimate the magnitude of potential chemical exposure among various receptor populations. The steps required to perform an exposure assessment include the following:

- Identification of potential receptor populations;
- Evaluation of potential exposure pathways for completeness;
- Evaluation of potential exposure parameters;
- Estimation of exposure point concentrations; and
- Estimation of daily intake factors.

The approach of this risk assessment is to incorporate conservative exposure assumptions when estimating the magnitude of potential exposure, so that potential risks posed by the site are not underestimated. At the same time, exposure scenarios which are considered unlikely are excluded, since they do not reflect realistic exposure conditions. It is important to note that, in a risk assessment, exposure can be defined for both reasonable maximum exposure (RME) and average exposure. The RME is meant to represent the most exposed individual in a population, while the average exposure represents the most likely exposure for the potentially exposed population. Both RME and average exposure scenarios are evaluated in this risk assessment.

3.1 IDENTIFICATION OF POTENTIAL RECEPTOR POPULATIONS

Potential receptors include human, plant, and animal populations and environmental receptors (e.g. streams, ponds, and lakes) that may be impacted by site-related chemicals. An assessment of potentially impacted plant and animal populations are addressed under a separate evaluation (WCFS, 1996). Only potential human receptor populations are addressed in this risk assessment. Populations to be evaluated include those individuals most likely to come into contact with contaminated surface water and sediments in the four stream segments currently being assessed.

Because Tinker AFB is an active military facility with restricted access, local off-base populations cannot readily come into contact with the on-base portions of East or West Soldier Creek. For most site workers or visitors, exposure to the on-base portions of the creek is likely to be minimal, if at all. For purposes of the risk assessment, it was assumed that the population with the greatest potential for contact with surface water or sediment from the creek would be a construction worker involved in repair or installation of underground pipelines around or under the creek. Because land use at Tinker is unlikely to change in the foreseeable future, this scenario is considered a maximum exposure scenario for both current and future use conditions (evaluation of the maximum exposed population provides a conservative estimation of risks for all potentially exposed populations).

Off-base portions of East and West Soldier Creeks flow through several residential and non-residential areas. Access to the creek in these areas is essentially unrestricted, and a number of different receptors could potentially contact stream sediments and surface water. Of these, the receptor with the potential for maximum exposure is likely to be a local resident who swims or wades in the creek. This is particularly true for children, for whom the stream would act as an "attractive nuisance". Because a residential exposure scenario is highly conservative, evaluation of this scenario in the risk assessment should be protective of local populations under both current and future use conditions.

Based on the discussion presented above, the populations to be evaluated quantitatively in the risk assessment consist of the following:

- On-base construction worker
- Off-base child resident
- Off-base adult resident

3.2 EVALUATION OF POTENTIAL EXPOSURE PATHWAYS

An exposure pathway is the mechanism by which a receptor may come into contact with a chemical. As defined by RAGS (EPA, 1989a), there are four major elements that characterize a complete exposure pathway. These elements are:

- A source and mechanism of chemical release

- A transport medium for the chemical
- A point of potential receptor contact with the medium (i.e., an exposure point)
- A route of exposure (e.g. ingestion) for the receptor to come into contact with the chemical

For an exposure pathway to be complete, all four elements must be present. The absence of any one of these elements results in an incomplete exposure pathway for which site-related health risks do not exist. Thus, the evaluation of potential exposure pathways is necessary to focus on only those pathways are complete and could potentially impact human health.

To develop a conceptual understanding of the sites and their potential to impact human health and environment, a site conceptual exposure model (SCEM) is developed. This model represents a theoretical exposure analysis and is used to identify complete exposure pathways. **Figure 3-1** depicts the site conceptual exposure model for the four stream segments of concern in Soldier Creek. This model specifically identifies chemical sources, release mechanisms, transport media, exposure routes and receptor populations. Potential on-base sources of chemical release were identified previously in **Section 1.1** (Site Description) and **2.0** (Chemicals of Concern). The mechanism of release refers to the physicochemical properties of the chemicals that influence their mobility and potential contact with a receptor. The presence and identification of receptors was discussed in **Section 3.1** (Identification of Potential Receptor Populations). An evaluation of potential exposure pathways identified in the SCEM is presented in the following sections.

3.2.1 Identification of Potential Sources of Chemical Release

Numerous on-base and off-base sources of chemical release have been identified in previous investigations (see B&V, 1993, and NUS, 1989 for detailed reviews). On-base sources of contamination include:

- Outfalls from Building 3001
- Building 3001
- Southwest tank area
- North tank area
- IWTP

Besides the on-base sources of release, several potential off-base sources have also been identified (B&V, 1993):

- A paint shop
- The site of a former trailer park
- An auto repair shop
- A service station
- A salvage yard

Because the on-base sources differ in nature from the off-base sources, it is likely that the on-base receptors will be exposed to different chemical constituents and/or concentrations than off-base receptors.

3.2.2 Identification of Potential Exposure Points and Exposure Routes

Exposure points are the locations where potentially exposed populations may contact contaminated media. In the present risk assessment, surface water and sediments in Soldier Creek are the exposure points of concern. Groundwater exposure is being evaluated and is not included in current scope of this investigation.

Exposure routes are the mode of contact (inhalation, ingestion, or dermal contact) with the contaminated media. On-base construction workers could be exposed to contaminants in on-base portions of East and West Soldier Creek via incidental ingestion and dermal contact with surface water and sediments while performing excavation activities or wading in the creek where the construction activities are occurring.

The water level in the off-base portion of West Soldier Creek generally is very shallow and swimming is not possible. However, off-base residents may be exposed to surface water and sediments while wading. Ingestion and dermal contact with contaminated surface water and sediments while wading is assumed to represent complete exposure pathways for both child and adult resident receptors.

Although Soldier Creek does not include any swimming areas per se, several off-base portions of East Soldier creek are deep enough to swim in, and potentially could be used by

children for swimming. Thus a child resident swimming scenario will be evaluated quantitatively in this risk assessment. For adults a wading scenario is assumed. For both children and adults, exposure is assumed via ingestion and direct dermal contact with surface water and sediment.

Because both East and West Soldier Creeks are located in open, unconfined areas where atmospheric dilution would quickly attenuate the concentrations of volatilized compounds released from the creek, inhalation exposure is assumed to be minor or incomplete for all scenarios, and will not be evaluated in this risk assessment.

Potential exposure to contaminants in the surface water and sediments via ingestion of fish or game animals is not likely to be a significant pathway. Neither East or West Soldier Creeks contain a viable game fish population, and the location of Tinker AFB within the metropolitan area of Oklahoma City precludes any hunting activities. For these reasons, exposure to contaminants via the food chain is considered an incomplete (or minor) exposure pathway, and is not evaluated in this risk assessment.

3.3 RECEPTOR POPULATIONS NOT INCLUDED IN THE RISK ASSESSMENT

Certain potential receptor populations can be excluded from consideration in the risk assessment if they do not represent realistic exposure scenarios. Although sensitive populations (e.g., pregnant women, the elderly or infirm in hospitals or elderly care facilities, etc.) are likely to be located within the greater metropolitan area of Oklahoma City, they can be excluded from a quantitative evaluation since these populations are not likely to exposed to the media of concern (surface water and sediment).

3.4 EVALUATION OF POTENTIAL EXPOSURE PARAMETERS

To calculate the chronic daily intake (CDI) of COCs and to estimate the associated potential health risks, a number of exposure parameters must first be quantified. Parameters which are typically quantified include the following:

- Lifespan (days)

- Exposure duration (years)
- Exposure frequency (days/year)
- Exposure time (hours/day)
- Soil/sediment ingestion rate (mg/day)
- Body weight (kg)
- Exposed skin surface area (cm^2)
- Dermal soil adherence (mg/cm^2)
- Dermal soil absorption factor (unitless)
- Water ingestion rate (L/hour)
- Permeability constant (cm/hour)

These parameters are assigned numerical values (**Tables 3-1, 3-2, 3-3** and **3-4)** which are used to estimate the extent of chemical exposure. The numerical values used in the exposure algorithms have been developed using site-specific information supplemented by a number of EPA reference sources. EPA guidance used when developing exposure assumptions include the Exposure Factors Handbook (EPA, 1989b), OSWER Directive 9285.6-03 (Standard Default Exposure Factors; EPA, 1991a), Dermal Exposure Assessment: Principles and Applications (EPA, 1992a), EPA Region IV Guidance (Feb 11, 1992b) and RAGS (EPA, 1989a). Conservative exposure assumptions are used so that potential exposures and potential health risks are not underestimated.

3.4.1.1 Lifespan

As recommended in RAGS (1989a), lifespan is assumed to be the same for all receptor populations, and is given as 70 years.

3.4.1.2 Exposure Duration

Exposure duration refers to the number of years in which exposure occurs. On-base construction workers are assumed to be full time employees of Tinker and are assumed to have a RME duration of 25 years, as given in OSWER Directive 9285.6-03 (EPA, 1991a). For average exposure, the exposure duration of 5 years for an on-base construction worker is based on the average time an individual spends at one job, based on information supplied by the Bureau of Labor Statistics (U.S. Department of Labor, 1987). Residents are assumed to have a reasonable maximum exposure duration of 30 years (5 years between age 1-6, and 25

years afterward) based on the upper 90th percentile value for time spent in a single residence. The exposure duration for average exposure for an adult resident is assumed to be 9 years based on the mean time spent at a single residence (Exposure Factors Handbook, EPA, 1989b). For child residents the entire 5 year age-span (age 1-6) is conservatively assumed for average exposure.

3.4.1.3 Exposure Frequency

Exposure frequency refers to the number of days per year spent in direct contact with the creek. For RME and average exposure, on-base construction workers are assumed to spend 5 days and 1 day per year, respectively, working in the vicinity of the creeks. For adult residents, 1 day per month during the summer months (4 days/year) is assumed for RME. One half of the RME exposure frequency (2 days/year) is assumed for average exposure. For children (ages 1-6) , 2 days per week during the 17 summer weeks (34 days/year) is assumed for the RME exposure frequency. One half of the RME exposure frequency (17 days/year) is assumed for average exposure.

3.4.1.4 Exposure Time

Exposure time refers to the number of hours per day that a receptor is in contact with a potentially contaminated medium. For on-base construction workers, this is assumed to be 8 hours per day, reflecting a normal working day. For average exposure, one half of the time is assumed (4 hours/day) as the fraction of the working day the worker would be in direct contact with surface water or sediment. For adult residents, 2 and 1 hours per day exposure time were assumed for RME and average exposure, respectively. For children, exposure times of 6 and 3 hours per day were assumed for RME and average exposure, respectively.

3.4.1.5 Sediment Ingestion Rate

The sediment ingestion rate refers to the amount of sediment that is ingested daily. Upperbound ingestion rates provided by EPA (1991a) were used to evaluate RME exposure. The RME ingestion rates used in this risk assessment were 50 mg/day for workers, 100 mg/day for adult residents, and 200 mg/day for children. For average exposure, ingestion

rates of 10 mg/day were assumed for both workers and adult residents, based on information presented in the Exposure Factors Handbook (EPA, 1989b). An average ingestion rate of 100 mg/day was assumed for children, based on one-half the RME value.

3.4.1.6 Body Weight

Body weights were obtained from the Exposure Factors Handbook (EPA, 1989b) An adult body weight of 70 kg was used to evaluate construction workers. For adult and child residents, age-weighted average body weights of 57.1 kg and 15.1 kg, respectively, were calculated.

3.4.1.7 Skin Surface Area

Exposed skin surface area is important when evaluating uptake of chemicals that are absorbed dermally. For dermal exposure to surface water and sediment in West and East Soldier Creeks, an RME surface area of 9,800 cm^2 was estimated for an on-base construction worker, based on the adult surface areas of the head, hands, arms and lower legs (Exposure Factors Handbook; EPA, 1989b). For average exposure, an exposed area of 2000 cm^2 was assumed for the construction worker based on the surface area of hands and forearms. Whole body immersion (6,500 cm^2) was assumed for children swimming in the creek, both for RME and average exposure scenarios, as well as for the RME child wading scenario. The average exposed surface are for a wading child was assumed to 1,800 cm^2 based on the surface area for hands, forearms and feet. For adult residents, an RME surface area of 8,620 cm^2 was assumed, based on exposure of the head, hands, forearms, and lower legs. For average exposure an exposed surface area of 2,800 cm^2 was assumed, based on exposure of the hands, forearms and feet.

3.4.1.8 Dermal Sediment Adherence

Dermal sediment adherence is used, in conjunction with exposed skin surface area, to define the total amount of sediment adhering to exposed skin surfaces. EPA recommends 1.0 mg/cm^2 and 0.2 mg/cm^2 for upperbound (RME) exposure and average exposure, respectively (Dermal Exposure Assessment: Principles and Applications; EPA, 1992a).

3.4.1.9 Dermal Absorption Factor

The dermal sediment absorption factor provides an estimate of potential chemical absorption through the skin. As presented in USEPA Region IV guidance (1991c), dermal absorption is assumed to be 1.0 percent for organic chemicals and 0.1 percent for inorganic chemicals.

3.4.1.10 Surface Water Ingestion Rate

An RME surface water ingestion rate of 0.05 L/hour was assumed for children swimming in East Soldier Creek, based on data presented in RAGS (EPA, 1989a). For average exposure while swimming, an ingestion rate of 0.025 L/hour was assumed, based on one-half the RME value.

Surface water ingestion while wading is assumed to be significantly less than while swimming. For all wading scenarios, the RME surface water ingestion rate was assumed to be 0.005 L/hour and the average surface water ingestion rate was assumed to 0.0025 L/hour, based on the assumption that ingestion during wading is ten percent of the ingestion rate during swimming.

3.4.1.11 Permeability Constant

Permeability constants are chemical-specific values used to define the dermal uptake of chemicals from aqueous media, and are presented in units of cm/hour. Permeability constants used in this risk assessment are derived from Dermal Exposure Assessment: Principles and Applications (EPA, 1992a).

3.5 ESTIMATION OF EXPOSURE POINT CONCENTRATION

Exposure point concentrations are chemical concentrations to which a receptor is exposed when contact is made with a specific environmental medium. The RME and average exposure point concentrations for the COCs are presented in **Tables 3-5 to 3-14.**

When calculating exposure point concentrations for the COCs, chemicals were assumed to be present at one-half the detection limit for any samples in which they were reported as

undetected, in accordance with RAGS (1989a). Exposure point concentrations for both surface water and sediments are calculated as the upper 95 percent confidence limit values (UCL) of the arithmetic mean concentration assuming lognormal distribution, using the approach recommended by EPA (OSWER 9285.7-080, 1992), as shown below:

$$UCL = e^{(m + 0.5S^2 + SH/\sqrt{n-1})}$$

Where:

UCL = Upper 95 percent confidence level

e = Constant (base of natural log, equal to 2.718)

m = mean of transformed data

S = Standard Deviation of the transformed data

n = number of samples

H = H-statistics (from table published in Gilbert, 1987)

The concentration associated with the 95 percent UCL or the maximum concentration detected, whichever was lower, was adopted as the RME exposure point concentration. Use of the maximum concentration, if less than the 95 percent UCL, is recommended by RAGS (EPA, 1989a). This approach is supported by the observation that the 95 percent UCL concentration may exceed the maximum detected concentration in instances where the variation of the data is large or when high detection limits strongly influence calculation of 95 percent UCL values. The concentration associated with the RME exposure point concentration or the mean concentration, whichever was lower, was adopted as the average exposure point concentration.

Exposure point concentrations calculated for surface water (presented in **Tables 3-5, 3-6, 3-7** and **3-8**) are used to calculate risks associated with both current and future use scenarios. Sediment samples collected from 0-0.5 feet are considered to be associate with current use scenarios and samples collected from 0-5.0 feet are considered to be associated with future use scenarios. **Table 3-9** presents the current on-base West Soldier Creek sediment exposure

point concentrations. **Table 3-11** presents the future on-base West Soldier Creek sediment exposure point concentrations. Because all the sediment samples collected at off-base Soldier Creek are within 0-0.5 feet, **Table 3-11** presents both the current and future off-base West Soldier Creek sediment exposure point concentrations. **Table 3-12** presents the on-base current sediment exposure point concentrations. **Table 3-13** present the on-base East Soldier Creek future sediment exposure point concentrations. **Table 3-14** presents the off-base East Soldier Creek current sediment exposure point concentrations. **Table 3-15** presents the off-base East Soldier Creek future sediment exposure point concentrations.

3.6 CALCULATION OF DAILY CHEMICAL INTAKES

Chronic daily intakes (CDIs) represent the daily amount of chemical taken in by a receptor per kilogram body weight, and are used with the Critical Toxicity Values (CTVs) to estimate hazard quotients and potential cancer risks for each chemical (see detailed discussion in **Section 4.0**). The CDIs are calculated for individual chemicals and receptors, based on the potential exposure parameters discussed in **Section 3.4** using the following equations:

Surface water ingestion for on-base worker scenario:

$$CDI = (CW \times IR \times ET \times EF \times ED)/(BW \times AT1 \times AT2)$$

Surface water dermal exposure for on-base worker scenario:

$$CDI = (CW \times SA \times PC \times ET \times EF \times ED \times CF)/(BW \times AT1 \times AT2)$$

Sediment ingestion for on-base worker scenario:

$$CDI = (CS \times CF \times IR \times EF \times ED)/(BW \times AT1 \times AT2)$$

Sediment dermal exposure for on-base worker scenario:

$$CDI = (CS \times CF \times SA \times AF \times ABS \times EF \times ED)/(BW \times AT1 \times AT2)$$

Surface water ingestion for off-base residential scenario:

$$CDI = CW \times HIF \quad and$$

$$HIF = [(IRc \times ETc \times EFc \times EDc) / BWc + (IRa \times ETa \times EFa \times EDa) / BWa] / (AT1 \times AT2)$$

Surface water dermal exposure for off-base residential scenario:

$$CDI = CW \times HIF \quad \text{and}$$

$$HIF = \{ [(SAc \times PC \times ETc \times EFc \times EDc) / BWc + (SAa \times PC \times ETa \times EFa \times EDa) / BWa] / (AT1 \times AT2)\} \times CF$$

Sediment ingestion for off-base residential scenario:

$$CDI = CW \times HIF \quad \text{and}$$

$$HIF = \{[(IRc \times EFc \times EDc) / BWc + (IRa \times EFa \times EDa) / BWa] \times CF\} / (AT1 \times AT2)$$

Sediment dermal exposure for off-base residential scenario:

$$CDI = CS \times AF \times HIF \quad \text{and}$$

$$HIF = \{[(SAc \times EFc \times EDc \times ABS) / BWc + (SAa \times EFa \times EDa \times ABS) / BWa] \times CF\} / (AT1 \times AT2)$$

Where:

CDI = Chronic Daily Intake

HIF = Human Intake Factor

CW = Concentration in Surface Water

CS = Concentration in Sediments

IR = Ingestion Rate (L/hour for surface water, mg/day for sediments)

IRc = Child Resident Ingestion Rate (L/hour for surface water, mg/day for sediments)

IRa = Adult Resident Ingestion Rate (L/hour for surface water, mg/day for sediments)

ET = Worker Exposure Time (hours)

ETc = Chile Resident Exposure Time (hours)

ETa = Adult Resident Exposure Time (hours)

SA = Worker Skin surface area available for contact (cm^2)

SAc = Child Resident Skin surface area available for contact (cm^2)

SAa = Adult Resident Skin surface area available for contact (cm^2)

EF = Worker Exposure Frequency

EFc = Child Resident Exposure Frequency

EFa = Adult Resident Exposure Frequency

ED = Worker Exposure Duration

EDc = Child resident Exposure Duration

EDa = Adult Resident Exposure Duration

BW = Worker Body Weight (kg)

BWc = Child Body Weight (kg)

BWa = Adult Body Weight (kg)

AF = Adherence Factor

ABS = Absorption Factor

AT1 = Days Per Year = 365 days/year

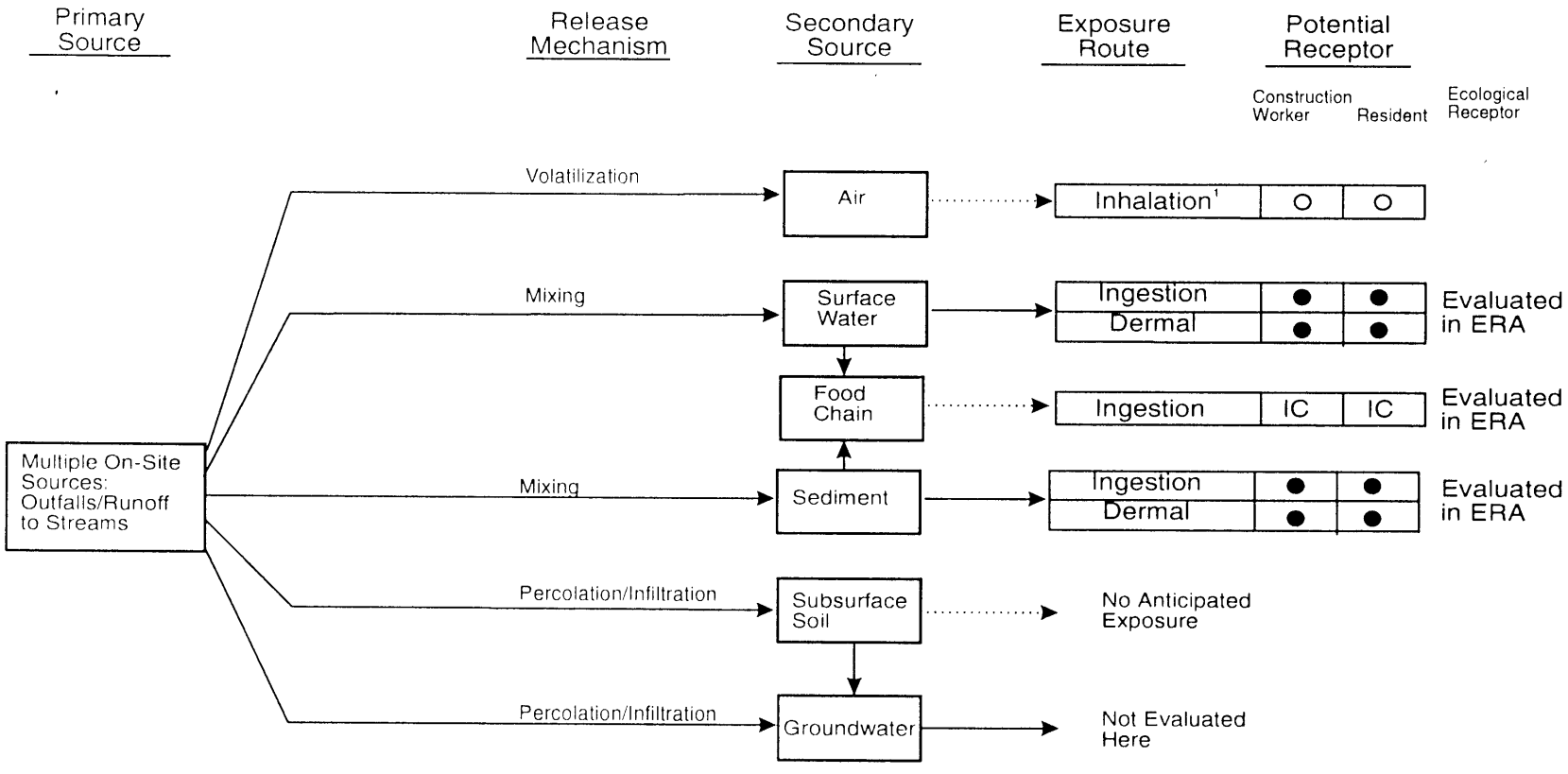
AT2 = Averaging Time (70 years for carcinogenic effects, duration exposure for non-carcinogenic effects)

CS = Conversion Factor

Attachment A presents the CDI calculations associated with each media, route of exposure and receptor.

FIGURE 3-1

Site Conceptual Exposure Model - East and West Soldier Creek
Tinker Air Force Base, Oklahoma City, Oklahoma



[1] Inhalation exposure to volatilized compounds is anticipated to be minor due to atsmospheric dilution.

- - - Incomplete Pathway or Minor Pathway

____ Complete Pathway

O Minor Exposure Route

● Complete Exposure Route

IC Incomplete Exposure Route

Graphics\F93506\FIGA CDR 11/20/95

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TABLE 3-1

EXPOSURE PARAMETERS
DERMAL CONTACT WITH SEDIMENTS

Exposure Parameter	ADULT RESIDENT		CHILD		CONSTRUCTION WORKER	
	RME [a]	AVERAGE	RME [a]	AVERAGE	RME [a]	AVERAGE
(SA) Exposed Surface Area - wading (cm^2)	8,620 [b,n]	2,800 [b,n]	6,500 [c,n]	1,800 [c,n]	9,800 [b]	2,000 [e]
(SA) Exposed Surface Area - swimming (cm^2)	na	na	6,500 [d,n]	6,500 [d,n]	na	na
(AF) Dermal Sediment Adherence (mg/cm^2)	1.00 [f]	0.20 [f]	1.00 [f]	0.20 [f]	1.00 [f]	0.20 [f]
(ABS) Absorption Factor (unitless)	Chemical Specific [g]					
(ED) Exposure Duration (years)	25 [h]	9 [i]	5 [h]	5 [r]	25 [j]	5 [j]
(EF) Exposure Frequency (days/year)	4 [k]	2 [o]	34 [l]	17 [o]	5 [m]	1 [m]
(BW) Body Weight (kg)	57.1 [n]	57.1 [n]	15.1 [n]	15.1 [n]	70	70
(AT1) Averaging Time - Non-carcinogenic Effects (years)[p]	25	9	5	5	25	5
(AT2) Averaging Time - Cancer Effects (years)[q]	70	70	70	70	70	70

Note:

a. Reasonable Maximum Exposure (RME) is defined by EPA as the reasonable upperbound exposure among potentially exposed populations.

b. The surface area of head, hands, arms, and lower legs is assumed for RME.The surface area of hands, forearms and feet is assumed for average exposure.

c. Exposed surface area is based on whole body for RME. For average exposure, surface area of hands, forearms, and feet are used.

d. Exposed surface area is based on whole body for both RME and average exposure.

e. Average exposed surface for construction worker based on hands and forearms.

f. Dermal adherence based on Dermal Exposure Assessment: Principles and Applications (USEPA, 1992).

g. Based on the EPA Region IV Guidance (Feb. 11, 1992), 1.0% dermal absorption is assumed for organics and 0.1% for inorganics.

h. Residents are assumed to have a RME duration of 30 years (5 years between age 1-6, 25 years as adult), based on the upper 90th percentile value for time spent in a single residence (Exposure Factors Handbook, USEPA,1989).

i. Average duration at a single residence is 9 years, as identified in Exposure Factors Handbook (USEPA, 1989).

j. Construction workers are assumed to have an RME duration of 25 years as given in OSWER Directive 9285.6-03 (EPA, 1991). For average exposure, the exposure duration of 5 years is based on the average time spent at a job (U.S. Department of Labor, 1987).

k. Assumes 1 day/month exposure during the 4 months of summer.

l. Assumes 2 day/week exposure for the 17 weeks of summer.

m. Exposure frequency for construction workers assumes minor construction activities in the creek.

n. Age-weighted average.

o. Assumed value based on one-half the RME value.

p. Averaging time for non-carcinogenic effects is based on the exposure duration.

q. Averaging time for carcinogenic effects is based on assumed lifetime of 70 years.

r. Average exposure duration for a child assumes entire 5 year age span (age 1-6).

na. Not applicable.

TABLE 3-2

EXPOSURE PARAMETERS
INGESTION OF SEDIMENTS

Exposure Parameter	ADULT RESIDENT		CHILD		CONSTRUCTION WORKER	
	RME [a]	AVERAGE	RME [a]	AVERAGE	RME [a]	AVERAGE
(IR) Ingestion Rate (mg/day)	100 [b]	10 [c]	200 [b]	100 [k]	50 [b]	10 [c]
(ED) Exposure Duration (years)	25 [d]	9 [e]	5 [d]	5 [n]	25 [f]	5 [f]
(EF) Exposure Frequency (days/year)	4 [g]	2 [k]	34 [h]	17 [k]	5 [i]	1 [i]
(BW) Body Weight (kg)	57.1 [j]	57.1 [j]	15.1 [j]	15.1 [j]	70	70
(AT1) Averaging Time - Non-carcinogenic Effects (years)[l]	25	9	5	5	25	5
(AT2) Averaging Time - Cancer Effects (years)[m]	70	70	70	70	70	70

Note:

a. Reasonable Maximum Exposure (RME) is defined by EPA as the reasonable upperbound exposure among potentially exposed populations.

b. For RME, standard default sediment ingestion rates of 100 mg/day for adult resident, 200mg/day for children and 50 mg/day for workers were assumed (USEPA, 1

c. Average ingestion rate as identified in Exposure Factors Handbook (USEPA, 1989).

d. Residents are assumed to have a RME duration of 30 years (5 years between age 1-6, 25 years as adult), based on the upper 90th percentile value for time spent in a single residence (Exposure Factors Handbook, USEPA,1989).

e. Average duration at a single residence is 9 years, as identified in Exposure Factors Handbook (USEPA, 1989).

f. Construction workers are assumed to have an RME duration of 25 years as given in OSWER Directive 9285.6-03 (EPA, 1991). For average exposure, the exposure duration of 5 years is based on the average time spent at a job (U.S. Department of Labor, 1987).

g. Assumes 1 day/month exposure during the 4 months of summer.

h. Assumes 2 day/week for the 17 weeks of summer.

i. Exposure frequency for construction workers assumes minor construction activities in the creek.

j. Age-weighted average.

k. Assumed value based on one-half the RME value.

l. Averaging time for non-carcinogenic effects is based on the exposure duration.

m. Averaging time for carcinogenic effects is based on assumed lifetime of 70 years.

n. Average exposure duration for a child assumes entire 5 year age span (age 1-6).

TABLE 3-3

EXPOSURE PARAMETERS
DERMAL CONTACT WITH SURFACE WATER

Exposure Parameter	ADULT RESIDENT		CHILD		CONSTRUCTION WORKER	
	RME [a]	AVERAGE	RME [a]	AVERAGE	RME [a]	AVERAGE
(SA) Exposed Surface Area - wading (cm^2)	8,620 [c,m]	2,800 [e,m]	6,500 [d,m]	1,800 [e,m]	9,800 [c]	2,000 [f]
(SA) Exposed Surface Area - swimming (cm^2)[b]	na	na	6,500 [d,m]	6,500 [d,m]	na	na
(PC) Dermal Permeability Constant (cm/hour)	Chemical Specific					
(ET) Exposure Time (hours/day)	2	1 [o]	6	3 [o]	8	4 [o]
(ED) Exposure Duration (years)	25 [g]	9 [h]	5 [g]	5 [r]	25 [i]	5 [i]
(EF) Exposure Frequency (days/year)	4 [j]	2 [o]	34 [k]	17 [o]	5 [l]	1 [l]
(BW) Body Weight (kg)	57.1 [m]	57.1 [m]	15.1 [m]	15.1 [m]	70	70
(AT1) Averaging Time - Non-carcinogenic Effects (years)[p]	25	9	5	5	25	5
(AT2) Averaging Time - Cancer Effects (years)[q]	70	70	70	70	70	70

Note:

a. Reasonable Maximum Exposure (RME) is defined by EPA as the reasonable upperbound exposure among potentially exposed populations.
b. Swimming is only evaluated for the child scenario in off-base portions of East Soldier Creek.
c. The surface area of head, hands, arms, and lower legs is assumed for RME.
d. Exposed surface area is based on whole body exposure.
e. Average exposure assumes surface area of hands, forearms, and feet.
f. Average exposed surface area for construction workers based on hands and forearms.
g. Residents are assumed to have a RME duration of 30 years (5 years between age 1-6, 25 years as adult), based on the upper 90th percentile value for time spent in a single residence (Exposure Factors Handbook, USEPA,1989).
h. Average duration at a single residence is 9 years, as identified in Exposure Factors Handbook (USEPA, 1989).
i. Construction workers are assumed to have an RME duration of 25 years as given in OSWER Directive 9285.6-03 (EPA, 1991).
For average exposure, the exposure duration of 5 years is based on the average time spent at a job (U.S. Department of Labor, 1987).
j. Assumes 1 day/month exposure during the 4 months of summer.
k. Assumes 2 day/week exposure for the 17 weeks of summer.
l. Exposure frequency for construction workers assumes minor construction activities in the creek.
m. Age-weighted average.
o. Assumed value based on one-half the RME value.
p. Averaging time for non-carcinogenic effects is based on the exposure duration.
q. Averaging time for carcinogenic effects is based on lifetime of 70 years.
r. Average exposure duration for a child assumes entire 5 year age span (age 1-6).
na. Not applicable.

TABLE 3-4

EXPOSURE PARAMETERS
INGESTION OF SURFACE WATER

Parameter	ADULT RESIDENT		CHILD		CONSTRUCTION WORKER	
	RME [a]	AVERAGE	RME [a]	AVERAGE	RME [a]	AVERAGE
(IR) Ingestion Rate - wading (L/hour)	0.005 [c]	0.0025 [l]	0.005 [c]	0.0025 [l]	0.005 [c]	0.0025 [l]
(IR) Ingestion Rate - Swimming (L/hour)[b]	na	na	0.050 [d]	0.025 [l]	na	na
(ET) Exposure Time (hours/day)	2	1 [l]	6	3 [l]	8	4 [l]
(ED) Exposure Duration (years)	25 [e]	9 [f]	5 [e]	5 [o]	25 [g]	5 [g]
(EF) Exposure Frequency (days/year)	4 [h]	2 [l]	34 [i]	17 [l]	5 [j]	1 [j]
(BW) Body Weight (kg)	57.1 [k]	57.1 [k]	15.1 [k]	15.1 [k]	70	70
(AT1) Averaging Time - Non-carcinogenic Effects (years)[m]	25	9	5	5	25	5
(AT2) Averaging Time - Cancer Effects (years)[n]	70	70	70	70	70	70

Note:

a. Reasonable Maximum Exposure (RME) is defined by EPA as the reasonable upperbound exposure among potentially exposed populations.
b. Swimming is only evaluated for the child scenario in off-base portions of East Soldier Creek.
c. Assumed to be one-tenth of the surface water ingestion rate while swimming.
d. Surface water ingestion rate while swimming as identified in RAGS (USEPA, 1989).
e. Residents are assumed to have a RME duration of 30 years (5 years between age 1-6, 25 years as adult), based on the upper 90th percentile value for time spent in a single residence (Exposure Factors Handbook, USEPA,1989).
f. Average duration at a single residence is 9 years, as identified in Exposure Factors Handbook (USEPA, 1989).
g. Construction workers are assumed to have an RME duration of 25 years as given in OSWER Directive 9285.6-03 (EPA, 1991). For average exposure, the exposure duration of 5 years is based on the average time spent at a job (U.S. Department of Labor, 1987).
h. Assumes 1 day/month exposure during the 4 months of summer.
i. Assumes 2 day/week exposure for the 17 weeks of summer.
j. Exposure frequency for construction workers assumes minor construction activities in the creek.
k. Age-weighted average.
l. Assumed value based on one-half the RME value.
m. Averaging time for non-carcinogenic effects is based on the exposure duration.
n. Averaging time for carcinogenic effects is based on lifetime of 70 years.
o. Average exposure duration for a child assumes entire 5 year age span (age 1-6).
na. Not applicable.

TABLE 3-5

EXPOSURE POINT CONCENTRATIONS
ON-BASE WEST SOLDIER CREEK SURFACE WATER
(CURRENT AND FUTURE SCENARIOS)

Chemical	Maximum Detected Concentration (mg/L)	Mean[a] (mg/L)	UCL[a,b] (mg/L)	RME Exposure Point Conc.[c] (mg/L)	Average Exposure Point Conc.[d] (mg/L)
Metals					
Arsenic	3.50E-03	2.54E-03	4.60E-03	3.50E-03	2.54E-03
Cobalt	3.10E-02	9.00E-03	2.06E-02	2.06E-02	9.00E-03
Nickel	3.30E-01	6.89E-02	3.08E-01	3.08E-01	6.89E-02
Vanadium	1.30E-02	6.46E-03	9.06E-03	9.06E-03	6.46E-03
Semivolatile Organics					
3/4-Methylphenol	1.70E-03	4.53E-03	6.91E-03	1.70E-03	1.70E-03
N-Nitroso-di-n-propylamine	1.80E-03	4.54E-03	6.67E-03	1.80E-03	1.80E-03
Phenol	1.40E-03	4.49E-03	7.60E-03	1.40E-03	1.40E-03
Volatile Organics					
Acetone	6.70E-03	5.19E-03	5.72E-03	5.72E-03	5.19E-03
Chlorobenzene	1.80E-03	2.40E-03	2.66E-03	1.80E-03	1.80E-03
Methylene chloride	2.60E-03	2.09E-03	2.87E-03	2.60E-03	2.09E-03
Tetrachloroethene	1.10E-02	4.36E-03	9.79E-03	9.79E-03	4.36E-03
Toluene	1.70E-03	2.39E-03	2.69E-03	1.70E-03	1.70E-03
Trichloroethene	1.40E-02	3.94E-03	1.00E-02	1.00E-02	3.94E-03
Vinyl chloride	1.00E-03	4.43E-03	9.55E-03	1.00E-03	1.00E-03

Note:

a. One half of the detection limit is used for all non-detects when calculating values.

b. The upper 95 percent confidence limit values (UCL) of the arithmetic mean concentration assuming lognormal distribution.

c. The concentration associated with the 95 percent UCL or the maximum concentration detected, whichever was lower was used as the RME exposure point concentration.

d. The RME exposure point concentration or the mean concentration, whichever was lower, was adopted as the average exposure point concentration.

TABLE 3-6

EXPOSURE POINT CONCENTRATIONS
OFF-BASE WEST SOLDIER CREEK SURFACE WATER
(CURRENT AND FUTURE SCENARIOS)

Chemical	Maximum Detected Concentration (mg/L)	Mean[a] (mg/L)	UCL[a,b] (mg/L)	RME Exposure Point Conc. [c] (mg/L)	Average Exposure Point Conc. [d] (mg/L)
Metals					
Arsenic	1.80E-03	2.39E-03	3.75E-03	1.80E-03	1.80E-03
Thallium	1.10E-03	4.20E-03	7.56E-03	1.10E-03	1.10E-03
Vanadium	1.40E-02	9.24E-03	1.37E-02	1.37E-02	9.24E-03
Volatile Organics					
Carbon disulfide	1.00E-03	2.31E-03	3.05E-03	1.00E-03	1.00E-03
Methylene chloride	2.70E-03	2.26E-03	2.87E-03	2.70E-03	2.26E-03

Note:

a. One half of the detection limit is used for all non-detects when calculating values.

b. The upper 95 percent confidence limit values (UCL) of the arithmetic mean concentration assuming lognormal distribution.

c. The concentration associated with the 95 percent UCL or the maximum concentration detected, whichever was lower was used as the RME exposure point concentration.

d. The RME exposure point concentration or the mean concentration, whichever was lower, was adopted as the average exposure point concentration.

TABLE 3-7

EXPOSURE POINT CONCENTRATIONS
ON-BASE EAST SOLDIER CREEK SURFACE WATER
(CURRENT AND FUTURE SCENARIOS)

Chemical	Maximum Detected Concentration (mg/L)	Mean[a] (mg/L)	UCL[a,b] (mg/L)	RME Exposure Point Conc.[c] (mg/L)	Average Exposure Point Conc.[d] (mg/L)
Metals					
Arsenic	3.30E-03	2.21E-03	2.45E-03	2.45E-03	2.21E-03
Molybdenum	5.70E-01	1.26E-01	2.64E-01	2.64E-01	1.26E-01
Nickel	9.30E-02	2.06E-02	2.24E-02	2.24E-02	2.06E-02
Vanadium	3.00E-02	1.50E-02	1.76E-02	1.76E-02	1.50E-02
Chlorinated Pesticides					
Aldrin	1.00E-04	5.13E-05	1.02E-04	1.00E-04	5.13E-05
Semivolatile Organics					
4-Nitrophenol	2.00E-03	2.17E-02	4.11E-02	2.00E-03	2.00E-03
Benzoic acid	3.90E-03	2.19E-02	3.49E-02	3.90E-03	3.90E-03
Benzyl alcohol	1.70E-03	4.69E-03	5.43E-03	1.70E-03	1.70E-03
bis(2-Ethylhexyl)phthalate	4.60E-03	4.60E-03	5.55E-03	4.60E-03	4.60E-03
Fluoranthene	1.50E-03	4.80E-03	5.35E-03	1.50E-03	1.50E-03
Phenol	3.50E-03	4.61E-03	5.20E-03	3.50E-03	3.50E-03
Volatile Organics					
2-Butanone (MEK)	2.80E-03	4.85E-03	5.17E-03	2.80E-03	2.80E-03
Acetone	1.20E-02	6.26E-03	6.79E-03	6.79E-03	6.26E-03
Bromoform	2.60E-03	2.33E-03	2.46E-03	2.46E-03	2.33E-03
Chloroform	1.80E-03	2.45E-03	2.53E-03	1.80E-03	1.80E-03
Methylene chloride	1.50E-01	7.04E-03	5.55E-03	5.55E-03	5.55E-03
Toluene	1.40E-03	2.43E-03	2.56E-03	1.40E-03	1.40E-03

Note:

a. One half of the detection limit is used for all non-detects when calculating values.

b. The upper 95 percent confidence limit values (UCL) of the arithmetic mean concentration assuming lognormal distribution.

c. The concentration associated with the 95 percent UCL or the maximum concentration detected, whichever was lower was used as the RME exposure point concentration.

d. The RME exposure point concentration or the mean concentration, whichever was lower, was adopted as the average exposure point concentration.

TABLE 3-8

EXPOSURE POINT CONCENTRATIONS
OFF-BASE EAST SOLDIER CREEK SURFACE WATER
(CURRENT AND FUTURE SCENARIOS)

Chemical	Maximum Detected Concentration (mg/L)	Mean[a] (mg/L)	UCL[a,b] (mg/L)	RME Exposure Point Conc.[c] (mg/L)	Average Exposure Point Conc.[d] (mg/L)
Metals					
Arsenic	1.40E-03	2.21E-03	3.47E-03	1.40E-03	1.40E-03
Cadmium	3.60E-03	2.64E-03	2.90E-03	2.90E-03	2.64E-03
Cobalt	6.80E-03	5.23E-03	5.66E-03	5.66E-03	5.23E-03
Nickel	8.00E-02	2.99E-02	5.95E-02	5.95E-02	2.99E-02
Thallium	1.20E-03	9.21E-03	3.03E-02	1.20E-03	1.20E-03
Vanadium	1.10E-02	6.66E-03	8.38E-03	8.38E-03	6.66E-03
Chlorinated Pesticides					
Aldrin	1.00E-04	5.36E-05	1.36E-04	1.00E-04	5.36E-05
Semivolatile Organics					
bis(2-Ethylhexyl)phthalate	3.60E-03	4.10E-03	6.36E-03	3.60E-03	3.60E-03
Phenol	1.20E-03	3.53E-03	9.84E-03	1.20E-03	1.20E-03
Volatile Organics					
Acetone	6.10E-03	5.30E-03	5.65E-03	5.65E-03	5.30E-03
Methylene chloride	5.10E-02	1.25E-02	1.86E-01	5.10E-02	1.25E-02

Note:

a. One half of the detection limit is used for all non-detects when calculating values.

b. The upper 95 percent confidence limit values (UCL) of the arithmetic mean concentration assuming lognormal distribution.

c. The concentration associated with the 95 percent UCL or the maximum concentration detected, whichever was lower was used as the RME exposure point concentration.

d. The RME exposure point concentration or the mean concentration, whichever was lower, was adopted as the average exposure point concentration.

TABLE 3-9

EXPOSURE POINT CONCENTRATIONS
ON-BASE WEST SOLDIER CREEK SEDIMENTS
(CURRENT SCENARIO)

Chemical	Maximum Detected Concentration (mg/kg)	Mean[a,b] (mg/kg)	UCL[a,b,c] (mg/kg)	RME Exposure Point Conc.[c] (mg/kg)	Average Exposure Point Conc.[d] (mg/kg)
Metals					
Antimony	7.65E+00	4.60E+00	5.17E+00	5.17E+00	4.60E+00
Beryllium	1.90E+00	9.76E-01	1.20E+00	1.20E+00	9.76E-01
Cadmium	8.32E+01	1.28E+01	6.19E+01	6.19E+01	1.28E+01
Chromium	1.89E+03	2.68E+02	6.68E+02	6.68E+02	2.68E+02
Cobalt	1.23E+02	2.17E+01	3.02E+01	3.02E+01	2.17E+01
Lead	2.25E+02	7.03E+01	1.21E+02	1.21E+02	7.03E+01
Mercury	9.00E-01	1.43E-01	1.92E-01	1.92E-01	1.43E-01
Nickel	3.16E+03	4.08E+02	1.20E+03	1.20E+03	4.08E+02
Silver	2.05E+02	2.08E+01	1.02E+02	1.02E+02	2.08E+01
Thallium	1.15E+00	3.86E-01	5.01E-01	5.01E-01	3.86E-01
Vanadium	9.57E+01	3.36E+01	3.90E+01	3.90E+01	3.36E+01
PCBs/Pesticides					
Aldrin	2.15E-01	1.59E-02	3.38E-02	3.38E-02	1.59E-02
Aroclor 1254	2.40E+01	1.98E+00	4.42E+01	2.40E+01	1.98E+00
Semivolatile organics					
1,2-Dichlorobenzene	4.20E+00	6.05E-01	7.57E-01	7.57E-01	6.05E-01
1,4-Dichlorobenzene	4.20E+00	5.92E-01	7.93E-01	7.93E-01	5.92E-01
2,4-Dimethylphenol	4.20E+00	5.79E-01	8.54E-01	8.54E-01	5.79E-01
2-Methylnaphthalene	4.20E+00	5.89E-01	7.80E-01	7.80E-01	5.89E-01
3/4-Methylphenol	4.20E+00	5.77E-01	8.29E-01	8.29E-01	5.77E-01
Acenaphthene	4.20E+00	5.98E-01	9.07E-01	9.07E-01	5.98E-01
Anthracene	4.20E+00	5.94E-01	8.22E-01	8.22E-01	5.94E-01
Benzidine	3.20E+01	4.54E+00	5.65E+00	5.65E+00	4.54E+00
Benzo(a)anthracene	3.75E+00	7.10E-01	1.32E+00	1.32E+00	7.10E-01
Benzo(a)pyrene	2.60E+00	6.48E-01	1.16E+00	1.16E+00	6.48E-01
Benzo(b)fluoranthene	3.00E+00	8.89E-01	3.25E+00	3.00E+00	8.89E-01
Benzo(g,h,i)perylene	1.80E+00	4.48E-01	7.11E-01	7.11E-01	4.48E-01
Benzo(k)fluoranthene	4.20E+00	7.99E-01	1.52E+00	1.52E+00	7.99E-01
bis(2-Ethylhexyl)phthalate	8.00E+00	1.15E+00	2.10E+00	2.10E+00	1.15E+00
Butyl benzyl phthalate	4.20E+00	5.95E-01	7.42E-01	7.42E-01	5.95E-01
Chrysene	3.00E+00	7.07E-01	1.77E+00	1.77E+00	7.07E-01
Di-n-butyl phthalate	4.20E+00	5.96E-01	7.50E-01	7.50E-01	5.96E-01
Dibenz(a,h)anthracene	4.20E+00	5.96E-01	8.04E-01	8.04E-01	5.96E-01
Dibenzofuran	4.20E+00	5.95E-01	8.11E-01	8.11E-01	5.95E-01
Dimethyl phthalate	4.20E+00	5.81E-01	8.63E-01	8.63E-01	5.81E-01
Fluoranthene	5.70E+00	1.09E+00	3.37E+00	3.37E+00	1.09E+00
Fluorene	4.20E+00	5.98E-01	8.11E-01	8.11E-01	5.98E-01
Indeno(1,2,3-cd)pyrene	3.75E+00	5.54E-01	1.02E+00	1.02E+00	5.54E-01
Naphthalene	4.20E+00	6.01E-01	8.05E-01	8.05E-01	6.01E-01
Phenanthrene	4.20E+00	1.05E+00	2.59E+00	2.59E+00	1.05E+00
Pyrene	5.50E+00	1.01E+00	3.08E+00	3.08E+00	1.01E+00
Volatile Oragnics					
2-Butanone (MEK)	3.25E-02	8.84E-03	1.06E-02	1.06E-02	8.84E-03
Acetone	1.00E-01	2.20E-02	3.93E-02	3.93E-02	2.20E-02
Carbon disulfide	1.10E-02	3.97E-03	4.54E-03	4.54E-03	3.97E-03
Chlorobenzene	1.65E-02	4.20E-03	4.88E-03	4.88E-03	4.20E-03
Chloromethane	3.25E-02	8.48E-03	9.87E-03	9.87E-03	8.48E-03
Methylene chloride	2.40E-02	4.29E-03	5.51E-03	5.51E-03	4.29E-03
Tetrachloroethene	1.65E-02	4.38E-03	5.15E-03	5.15E-03	4.38E-03
Toluene	1.80E-02	4.46E-03	5.48E-03	5.48E-03	4.46E-03
Trichloroethene	1.65E-02	4.70E-03	5.67E-03	5.67E-03	4.70E-03
Vinyl chloride	3.25E-02	8.48E-03	9.87E-03	9.87E-03	8.48E-03

Note

a. Surface (0-0.5 feet) sediments data are used in the calculations.

b. One half of the detection limit is used for all non-detects when calculating values.

c. The upper 95 percent confidence limit values (UCL) of the arithmetic mean concentration assuming lognormal distribution.

d. The concentration associated with the 95 percent UCL or the maximum concentration detected, whichever was lower was used as the RME exposure point concentration.

e. The RME exposure point concentration or the mean concentration, whichever was lower, was adopted as the average exposure point concentration.

TABLE 3-10

EXPOSURE POINT CONCENTRATIONS
ON-BASE WEST SOLDIER CREEK SEDIMENTS
(FUTURE SCENARIO)

Chemical	Maximum Detected Concentration (mg/kg)	Mean[a,b] (mg/kg)	UCL[a,b,c] (mg/kg)	RME Exposure Point Conc. [c] (mg/kg)	Average Exposure Point Conc. [d] (mg/kg)
Metals					
Antimony	7.50E+00	4.39E+00	4.70E+00	4.70E+00	4.39E+00
Beryllium	1.90E+00	8.76E-01	1.00E+00	1.00E+00	8.76E-01
Cadmium	1.32E+02	1.98E+01	6.88E+01	6.88E+01	1.98E+01
Chromium	3.21E+03	4.14E+02	7.64E+02	7.64E+02	4.14E+02
Cobalt	1.26E+02	2.42E+01	3.10E+01	3.10E+01	2.42E+01
Lead	7.46E+02	9.71E+01	1.62E+02	1.62E+02	9.71E+01
Mercury	9.00E-01	1.22E-01	1.39E-01	1.39E-01	1.22E-01
Nickel	3.16E+03	3.79E+02	7.55E+02	7.55E+02	3.79E+02
Silver	2.05E+02	1.86E+01	5.12E+01	5.12E+01	1.86E+01
Thallium	2.00E-01	3.56E-01	4.10E-01	2.00E-01	2.00E-01
Vanadium	9.57E+01	3.33E+01	3.73E+01	3.73E+01	3.33E+01
PCBs/Pesticides					
Aldrin	1.10E-02	2.04E-02	3.78E-02	1.10E-02	1.10E-02
Aroclor 1254	3.30E+01	2.96E+00	2.71E+01	2.71E+01	2.96E+00
Semivolatile organics					
1,2-Dichlorobenzene	5.70E-01	4.62E-01	5.07E-01	5.07E-01	4.62E-01
1,4-Dichlorobenzene	2.10E-01	4.45E-01	4.75E-01	2.10E-01	2.10E-01
2,4-Dimethylphenol	3.50E-01	4.72E-01	5.51E-01	3.50E-01	3.50E-01
2-Methylnaphthalene	1.50E-01	4.76E-01	5.47E-01	1.50E-01	1.50E-01
3/4-Methylphenol	2.20E-01	4.67E-01	5.33E-01	2.20E-01	2.20E-01
Acenaphthene	4.60E-01	4.28E-01	4.70E-01	4.60E-01	4.28E-01
Anthracene	8.50E-01	4.50E-01	5.49E-01	5.49E-01	4.50E-01
Benzidine	4.30E-01	3.69E+00	4.51E+00	4.30E-01	4.30E-01
Benzo(a)anthracene	3.10E+00	8.47E-01	1.63E+00	1.63E+00	8.47E-01
Benzo(a)pyrene	3.20E+00	9.05E-01	1.66E+00	1.66E+00	9.05E-01
Benzo(b)fluoranthene	6.60E+00	1.44E+00	3.90E+00	3.90E+00	1.44E+00
Benzo(g,h,i)perylene	1.90E+00	5.63E-01	8.40E-01	8.40E-01	5.63E-01
Benzo(k)fluoranthene	2.40E+00	6.51E-01	8.81E-01	8.81E-01	6.51E-01
bis(2-Ethylhexyl)phthalate	8.00E+00	1.35E+00	2.10E+00	2.10E+00	1.35E+00
Butyl benzyl phthalate	3.70E-01	4.99E-01	5.42E-01	3.70E-01	3.70E-01
Chrysene	5.00E+00	9.96E-01	2.29E+00	2.29E+00	9.96E-01
Di-n-butyl phthalate	1.50E-01	4.92E-01	5.32E-01	1.50E-01	1.50E-01
Dibenz(a,h)anthracene	7.50E-01	4.88E-01	5.40E-01	5.40E-01	4.88E-01
Dibenzofuran	3.60E-01	4.80E-01	5.27E-01	3.60E-01	3.60E-01
Dimethyl phthalate	7.50E-02	4.88E-01	5.95E-01	7.50E-02	7.50E-02
Fluoranthene	6.70E+00	1.66E+00	4.20E+00	4.20E+00	1.66E+00
Fluorene	5.70E-01	4.25E-01	4.40E-01	4.40E-01	4.25E-01
Indeno(1,2,3-cd)pyrene	1.70E+00	5.97E-01	9.47E-01	9.47E-01	5.97E-01
Naphthalene	4.50E-01	4.50E-01	4.64E-01	4.50E-01	4.50E-01
Phenanthrene	5.20E+00	1.21E+00	2.29E+00	2.29E+00	1.21E+00
Pyrene	6.80E+00	1.41E+00	3.44E+00	3.44E+00	1.41E+00
Volatile Oragnics					
2-Butanone (MEK)	2.60E-02	1.00E-02	1.15E-02	1.15E-02	1.00E-02
Acetone	1.30E-01	2.41E-02	3.38E-02	3.38E-02	2.41E-02
Carbon disulfide	1.10E-02	4.42E-03	4.78E-03	4.78E-03	4.42E-03
Chlorobenzene	1.00E-01	8.05E-03	7.80E-03	7.80E-03	7.80E-03
Chloromethane	3.30E-03	8.95E-03	9.73E-03	3.30E-03	3.30E-03
Methylene chloride	2.40E-02	4.45E-03	5.24E-03	5.24E-03	4.45E-03
Tetrachloroethene	1.60E-02	4.96E-03	5.45E-03	5.45E-03	4.96E-03
Toluene	1.80E-02	4.24E-03	4.82E-03	4.82E-03	4.24E-03
Trichloroethene	7.70E-02	6.75E-03	1.07E-02	1.07E-02	6.75E-03
Vinyl chloride	1.50E-02	9.75E-03	5.66E-03	5.66E-03	5.66E-03

Note

a. Sediment data collected from 0 - 5.0 feet depth are used in the calculations.

b. One half of the detection limit is used for all non-detects when calculating values.

c. The upper 95 percent confidence limit values (UCL) of the arithmetic mean concentration assuming lognormal distribution.

d. The concentration associated with the 95 percent UCL or the maximum concentration detected, whichever was lower was used as the RME exposure point concentration.

e. The RME exposure point concentration or the mean concentration, whichever was lower, was adopted as the average exposure point concentration

TABLE 3-11

EXPOSURE POINT CONCENTRATIONS
OFF-BASE WEST SOLDIER CREEK SEDIMENTS
(CURRENT AND FUTURE SCENARIO)

Chemical	Maximum Detected Concentration (mg/kg)	Mean[a,b] (mg/kg)	UCL[a,b,c] (mg/kg)	RME Exposure Point Conc. [c] (mg/kg)	Average Exposure Point Conc. [d] (mg/L)
Metals					
Antimony	8.10E+00	4.70E+00	6.42E+00	6.42E+00	4.70E+00
Beryllium	7.90E-01	2.79E-01	5.61E-01	5.61E-01	2.79E-01
Cobalt	1.02E+01	4.96E+00	8.22E+00	8.22E+00	4.96E+00
Lead	4.40E+03	5.74E+02	2.65E+04	4.40E+03	5.74E+02
Mercury	1.20E-01	6.75E-02	8.14E-02	8.14E-02	6.75E-02
Nickel	2.74E+02	5.55E+01	2.09E+02	2.09E+02	5.55E+01
Vanadium	2.67E+01	1.59E+01	2.55E+01	2.55E+01	1.59E+01
PCBs/Pesticides					
Aldrin	4.50E-02	9.80E-03	6.14E-02	4.50E-02	9.80E-03
Aroclor 1254	1.70E+00	7.64E-01	1.60E+01	1.70E+00	7.64E-01
delta-BHC	1.20E-03	5.38E-03	1.51E-02	1.20E-03	1.20E-03
Semivolatile organics					
Anthracene	7.50E-02	1.84E-01	2.48E-01	7.50E-02	7.50E-02
Benzo(a)anthracene	3.50E+00	6.16E-01	3.23E+00	3.23E+00	6.16E-01
Benzo(a)pyrene	2.10E+00	6.16E-01	1.52E+00	1.52E+00	6.16E-01
Benzo(b)fluoranthene	9.20E-01	2.45E-01	7.61E-01	7.61E-01	2.45E-01
Benzo(g,h,i)perylene	6.20E-01	2.44E-01	5.23E-01	5.23E-01	2.44E-01
Benzo(k)fluoranthene	5.30E+00	8.37E-01	3.54E+00	3.54E+00	8.37E-01
bis(2-Ethylhexyl)phthalate	4.90E+00	8.80E-01	6.49E+00	4.90E+00	8.80E-01
Chrysene	3.70E+00	7.18E-01	8.93E+00	3.70E+00	7.18E-01
Dibenz(a,h)anthracene	1.70E-01	1.88E-01	2.16E-01	1.70E-01	1.70E-01
Dimethyl phthalate	4.50E-02	1.80E-01	3.10E-01	4.50E-02	4.50E-02
Fluoranthene	5.30E+00	8.30E-01	1.53E+01	5.30E+00	8.30E-01
Indeno(1,2,3-cd)pyrene	6.00E-01	2.38E-01	5.38E-01	5.38E-01	2.38E-01
Phenanthrene	9.30E-01	2.67E-01	7.27E-01	7.27E-01	2.67E-01
Phenol	6.30E-02	1.82E-01	2.65E-01	6.30E-02	6.30E-02
Pyrene	6.40E+00	9.67E-01	1.57E+01	6.40E+00	9.67E-01
Volatile Oragnics					
Acetone	3.00E-02	9.28E-03	1.71E-02	1.71E-02	9.28E-03
Methylene chloride	3.50E-03	2.53E-03	3.30E-03	3.30E-03	2.53E-03
Toluene	2.20E-03	2.89E-03	3.14E-03	2.20E-03	2.20E-03
trans-1,2-Dichloroethene	1.50E-03	2.83E-03	3.46E-03	1.50E-03	1.50E-03

Note:

a. Sediment data collected from 0 - 5.0 feet depth are used in the calculations.

b. One half of the detection limit is used for all non-detects when calculating values.

c. The upper 95 percent confidence limit values (UCL) of the arithmetic mean concentration assuming lognormal distribution.

d. The concentration associated with the 95 percent UCL or the maximum concentration detected, whichever was lower was used as the RME exposure point concentration.

e. The RME exposure point concentration or the mean concentration, whichever was lower, was adopted as the average exposure point concentration.

TABLE 3-12

EXPOSURE POINT CONCENTRATIONS
ON-BASE EAST SOLDIER CREEK SEDIMENTS
(CURRENT SCENARIO)

Chemical	Maximum Detected Concentration (mg/kg)	Mean[a,b] (mg/kg)	UCL[a,b,c] (mg/kg)	RME Exposure Point Conc.[c] (mg/kg)	Average Exposure Point Conc.[d] (mg/L)
Metals					
Antimony	9.95E+00	5.56E+00	6.18E+00	6.18E+00	5.56E+00
Beryllium	9.60E-01	3.05E-01	3.98E-01	3.98E-01	3.05E-01
Cadmium	4.15E+02	3.38E+01	9.97E+01	9.97E+01	3.38E+01
Cobalt	2.16E+01	7.25E+00	1.13E+01	1.13E+01	7.25E+00
Lead	3.63E+02	8.92E+01	1.68E+02	1.68E+02	8.92E+01
Mercury	6.30E-01	2.53E-01	3.52E-01	3.52E-01	2.53E-01
Nickel	7.47E+02	1.04E+02	2.38E+02	2.38E+02	1.04E+02
Silver	5.32E+01	4.94E+00	7.72E+00	7.72E+00	4.94E+00
Vanadium	4.87E+01	1.79E+01	2.33E+01	2.33E+01	1.79E+01
PCBs/Pesticides					
Aldrin	4.05E+00	1.49E-01	6.81E-01	6.81E-01	1.49E-01
Aroclor 1254	4.00E+01	6.31E+00	3.27E+01	3.27E+01	6.31E+00
delta-BHC	4.05E+00	1.38E-01	3.45E-01	3.45E-01	1.38E-01
Heptachlor	5.20E+01	2.53E+00	2.20E+01	2.20E+01	2.53E+00
Semivolatile organics					
1,2,4-Trichlorobenzene	5.50E+00	7.84E-01	3.19E+00	3.19E+00	7.84E-01
1,2-Dichlorobenzene	5.50E+00	7.89E-01	3.23E+00	3.23E+00	7.89E-01
1,3-Dichlorobenzene	5.50E+00	7.85E-01	2.65E+00	2.65E+00	7.85E-01
1,4-Dichlorobenzene	5.50E+00	7.84E-01	3.40E+00	3.40E+00	7.84E-01
1-Chloronaphthalene	4.15E+01	6.27E+00	1.24E+01	1.24E+01	6.27E+00
2-Chloronaphthalene	5.50E+00	7.49E-01	1.91E+00	1.91E+00	7.49E-01
2-Methylnaphthalene	5.50E+00	7.32E-01	1.01E+00	1.01E+00	7.32E-01
4-Methylphenol	1.90E-02	9.67E-03	3.09E+00	1.90E-02	9.67E-03
Acenaphthene	8.00E+00	9.72E-01	1.56E+00	1.56E+00	9.72E-01
Acenaphthylene	5.50E+00	9.11E-01	4.12E+00	4.12E+00	9.11E-01
Anthracene	2.60E+01	1.79E+00	3.88E+00	3.88E+00	1.79E+00
Benzidine	3.70E+02	1.57E+01	1.88E+01	1.88E+01	1.57E+01
Benzo(a)anthracene	3.90E+01	3.71E+00	1.46E+01	1.46E+01	3.71E+00
Benzo(a)pyrene	2.60E+01	3.10E+00	8.99E+00	8.99E+00	3.10E+00
Benzo(b)fluoranthene	3.30E+01	3.89E+00	1.00E+01	1.00E+01	3.89E+00
Benzo(g,h,i)perylene	1.70E+01	1.81E+00	3.62E+00	3.62E+00	1.81E+00
Benzo(k)fluoranthene	3.90E+01	3.40E+00	6.36E+00	6.36E+00	3.40E+00
Benzoic acid	4.15E+01	6.23E+00	3.14E+01	3.14E+01	6.23E+00
bis(2-Ethylhexyl) phthalate	1.70E+01	2.84E+00	6.36E+00	6.36E+00	2.84E+00
Butyl benzyl phthalate	6.00E+00	9.68E-01	2.48E+00	2.48E+00	9.68E-01
Chrysene	3.50E+01	4.18E+00	1.25E+01	1.25E+01	4.18E+00
Di-n-butyl phthalate	5.50E+00	7.99E-01	1.42E+00	1.42E+00	7.99E-01
Di-n-octyl phthalate	5.50E+00	7.78E-01	1.08E+00	1.08E+00	7.78E-01
Dibenz(a,h)anthracene	1.00E+01	8.57E-01	1.88E+00	1.88E+00	8.57E-01
Dibenzofuran	5.50E+00	8.21E-01	1.32E+00	1.32E+00	8.21E-01
Dimethyl phthalate	5.50E+00	6.70E-01	1.93E+00	1.93E+00	6.70E-01
Fluoranthene	5.30E+01	7.22E+00	2.62E+01	2.62E+01	7.22E+00
Fluorene	1.20E+01	9.94E-01	1.86E+00	1.86E+00	9.94E-01
Indeno(1,2,3-cd)pyrene	1.90E+01	1.70E+00	3.25E+00	3.25E+00	1.70E+00
Naphthalene	5.90E+00	9.40E-01	2.39E+00	2.39E+00	9.40E-01
Phenanthrene	5.80E+01	5.65E+00	2.39E+01	2.39E+01	5.65E+00
Pyrene	5.10E+01	7.08E+00	2.40E+01	2.40E+01	7.08E+00
Volatile Oragnics					
2-Butanone (MEK)	2.90E+00	9.49E-02	3.81E-02	3.81E-02	3.81E-02
Acetone	9.50E-01	7.39E-02	1.16E-01	1.16E-01	7.39E-02
Benzene	6.00E-01	1.96E-02	1.28E-02	1.28E-02	1.28E-02
Carbon disulfide	6.00E-01	2.11E-02	9.98E-03	9.98E-03	9.98E-03
Chlorobenzene	1.80E+01	5.08E-01	1.22E-01	1.22E-01	1.22E-01
Ethylbenzene	6.00E-01	1.97E-02	1.37E-02	1.37E-02	1.37E-02
Methylene chloride	6.00E-01	1.98E-02	1.08E-02	1.08E-02	1.08E-02
Tetrachloroethene	6.00E-01	2.17E-02	1.15E-02	1.15E-02	1.15E-02
Toluene	6.00E-01	2.29E-02	1.58E-02	1.58E-02	1.58E-02
Xylenes (total)	6.00E-01	2.04E-02	1.25E-02	1.25E-02	1.25E-02

Note:

a. Surface (0-0.5 feet) sediments data are used in the calculations.

b. One half of the detection limit is used for all non-detects when calculating values

c. The upper 95 percent confidence limit values (UCL) of the arithmetic mean concentration assuming lognormal distribution.

d. The concentration associated with the 95 percent UCL or the maximum concentration detected, whichever was lower was used as the RME exposure point concentration.

e. The RME exposure point concentration or the mean concentration, whichever was lower, was adopted as the average exposure point concentrati

TABLE 3-13

EXPOSURE POINT CONCENTRATIONS
ON-BASE EAST SOLDIER CREEK SEDIMENTS
(FUTURE SCENARIO)

Chemical	Maximum Detected Concentration (mg/kg)	Mean[a,b] (mg/kg)	UCL[a,b,c] (mg/kg)	RME Exposure Point Conc.[c] (mg/kg)	Average Exposure Point Conc.[d] (mg/L)
Metals					
Antimony	22	5.63E+00	5.97E+00	5.97E+00	5.63E+00
Beryllium	0.96	3.14E-01	3.72E-01	3.72E-01	3.14E-01
Cadmium	415	4.46E+01	1.24E+02	1.24E+02	4.46E+01
Cobalt	56.7	7.65E+00	9.70E+00	9.70E+00	7.65E+00
Lead	480	9.05E+01	1.29E+02	1.29E+02	9.05E+01
Mercury	3.5	3.07E-01	3.45E-01	3.45E-01	3.07E-01
Nickel	1220	1.10E+02	1.65E+02	1.65E+02	1.10E+02
Silver	130	8.63E+00	1.06E+01	1.06E+01	8.63E+00
Vanadium	48.7	1.70E+01	2.00E+01	2.00E+01	1.70E+01
PCBs/Pesticides					
Aldrin	0.84	1.25E-01	2.72E-01	2.72E-01	1.25E-01
Aroclor 1254	40	4.40E+00	1.25E+01	1.25E+01	4.40E+00
delta-BHC	0.37	1.08E-01	1.27E-01	1.27E-01	1.08E-01
Heptachlor	52	1.05E+00	4.50E+00	4.50E+00	1.05E+00
Semivolatile organics					
1,2,4-Trichlorobenzene	0.43	6.96E-01	3.29E+00	4.30E-01	4.30E-01
1,2-Dichlorobenzene	3.7	8.36E-01	3.63E+00	3.63E+00	8.36E-01
1,3-Dichlorobenzene	3	7.68E-01	2.79E+00	2.79E+00	7.68E-01
1,4-Dichlorobenzene	33	1.46E+00	5.99E+00	5.99E+00	1.46E+00
1-Chloronaphthalene	5.2	5.92E+00	1.09E+01	5.20E+00	5.20E+00
2-Chloronaphthalene	1.4	5.85E-01	1.59E+00	1.40E+00	5.85E-01
2-Methylnaphthalene	1.2	7.72E-01	3.23E+00	1.20E+00	7.72E-01
4-Methylphenol	0.019	5.93E-03	6.92E-03	6.92E-03	5.93E-03
Acenaphthene	8	9.11E-01	1.21E+00	1.21E+00	9.11E-01
Acenaphthylene	3.9	6.61E-01	8.06E+00	3.90E+00	6.61E-01
Anthracene	26	1.31E+00	3.05E+00	3.05E+00	1.31E+00
Benzidine	370	1.21E+01	1.19E+01	1.19E+01	1.19E+01
Benzo(a)anthracene	39	2.69E+00	1.43E+01	1.43E+01	2.69E+00
Benzo(a)pyrene	26	2.37E+00	9.96E+00	9.96E+00	2.37E+00
Benzo(b)fluoranthene	33	3.41E+00	1.52E+01	1.52E+01	3.41E+00
Benzo(g,h,i)perylene	17	1.32E+00	3.77E+00	3.77E+00	1.32E+00
Benzo(k)fluoranthene	39	2.10E+00	3.68E+00	3.68E+00	2.10E+00
Benzoic acid	0.17	6.35E+00	1.30E+01	1.70E-01	1.70E-01
bis(2-Ethylhexyl)phthalate	23	3.12E+00	6.67E+00	6.67E+00	3.12E+00
Butyl benzyl phthalate	6	7.81E-01	2.14E+00	2.14E+00	7.81E-01
Chrysene	35	3.11E+00	9.46E+00	9.46E+00	3.11E+00
Di-n-butyl phthalate	4.6	7.29E-01	1.88E+00	1.88E+00	7.29E-01
Di-n-octyl phthalate	11	9.55E-01	1.07E+00	1.07E+00	9.55E-01
Dibenz(a,h)anthracene	10	6.87E-01	1.43E+00	1.43E+00	6.87E-01
Dibenzofuran	5.5	7.96E-01	9.86E-01	9.86E-01	7.96E-01
Dimethyl phthalate	0.66	6.13E-01	2.52E+00	6.60E-01	6.13E-01
Fluoranthene	53	5.76E+00	1.87E+01	1.87E+01	5.76E+00
Fluorene	12	7.98E-01	1.71E+00	1.71E+00	7.98E-01
Indeno(1,2,3-cd)pyrene	19	1.27E+00	3.93E+00	3.93E+00	1.27E+00
Naphthalene	5.9	8.36E-01	2.49E+00	2.49E+00	8.36E-01
Phenanthrene	58	4.35E+00	1.29E+01	1.29E+01	4.35E+00
Pyrene	55	5.76E+00	1.78E+01	1.78E+01	5.76E+00
Volatile Oragnics					
2-Butanone (MEK)	2.9	7.22E-02	3.07E-02	3.07E-02	3.07E-02
Acetone	0.95	7.67E-02	9.96E-02	9.96E-02	7.67E-02
Benzene	0.0056	1.53E-02	1.03E-02	5.60E-03	5.60E-03
Carbon disulfide	0.011	1.91E-02	8.48E-03	8.48E-03	8.48E-03
Chlorobenzene	1500	4.21E+01	5.84E+00	5.84E+00	5.84E+00
Ethylbenzene	0.013	1.56E-02	1.44E-02	1.30E-02	1.30E-02
Methylene chloride	0.6	1.72E-02	9.88E-03	9.88E-03	9.88E-03
Tetrachloroethene	0.017	1.93E-02	8.78E-03	8.78E-03	8.78E-03
Toluene	0.073	1.94E-02	2.13E-02	2.13E-02	1.94E-02
Xylenes (total)	12	1.91E-01	3.25E-02	3.25E-02	3.25E-02

Note:

a. Sediment data collected from 0 - 5.0 feet depth are used in the calculations.

b. One half of the detection limit is used for all non-detects when calculating values.

c. The upper 95 percent confidence limit values (UCL) of the arithmetic mean concentration assuming lognormal distribution.

d. The concentration associated with the 95 percent UCL or the maximum concentration detected, whichever was lower was used as the RME exposure point concentration.

e. The RME exposure point concentration or the mean concentration, whichever was lower, was adopted as the average exposure point concentration.

TABLE 3-14

EXPOSURE POINT CONCENTRATIONS
OFF-BASE EAST SOLDIER CREEK SEDIMENTS
(CURRENT SCENARIO)

Chemical	Maximum Detected Concentration (mg/kg)	Mean[a,b] (mg/kg)	UCL[a,b,c] (mg/kg)	RME Exposure Point Conc. [c] (mg/kg)	Average Exposure Point Conc. [d] (mg/L)
Metals					
Antimony	4.20E+00	3.76E+00	3.94E+00	3.94E+00	3.76E+00
Beryllium	4.60E-01	2.66E-01	5.48E-01	4.60E-01	2.66E-01
Cadmium	1.23E+02	2.79E+01	8.88E+03	1.23E+02	2.79E+01
Cobalt	7.00E+00	4.73E+00	6.75E+00	6.75E+00	4.73E+00
Lead	7.48E+01	2.50E+01	1.51E+02	7.48E+01	2.50E+01
Mercury	6.00E-01	1.57E-01	7.64E-01	6.00E-01	1.57E-01
Nickel	3.26E+02	9.91E+01	1.63E+03	3.26E+02	9.91E+01
Silver	1.62E+01	4.57E+00	5.07E+01	1.62E+01	4.57E+00
Thallium	6.00E-01	3.44E-01	7.44E-01	6.00E-01	3.44E-01
Vanadium	2.44E+01	1.72E+01	2.34E+01	2.34E+01	1.72E+01
PCBs/Pesticides					
Aldrin	5.00E-02	1.02E-02	3.02E-01	5.00E-02	1.02E-02
alpha-BHC	9.70E+00	1.44E+00	2.53E+05	9.70E+00	1.44E+00
alpha-Chlordane	5.00E-02	8.23E-03	1.56E-01	5.00E-02	8.23E-03
Aroclor 1254	5.00E-02	9.04E-03	1.67E-01	5.00E-02	9.04E-03
Heptachlor	9.70E-01	1.98E-01	1.97E+07	9.70E-01	1.98E-01
Semivolatile organics					
1-Chloronaphthalene	1.75E+00	1.54E+00	1.65E+00	1.65E+00	1.54E+00
2-Chloronaphthalene	4.05E-01	1.83E-01	6.63E-01	4.05E-01	1.83E-01
2-Methylnaphthalene	2.30E-01	1.94E-01	2.40E-01	2.30E-01	1.94E-01
3/4-Methylphenol	4.05E-01	2.31E-01	2.97E-01	2.97E-01	2.31E-01
Acenaphthene	5.40E-01	2.55E-01	3.58E-01	3.58E-01	2.55E-01
Anthracene	7.90E-01	2.26E-01	8.19E-01	7.90E-01	2.26E-01
Benzo(a)anthracene	1.50E+00	2.60E-01	3.00E+00	1.50E+00	2.60E-01
Benzo(a)pyrene	1.30E+00	2.47E-01	2.78E+00	1.30E+00	2.47E-01
Benzo(b)fluoranthene	2.30E+00	3.51E-01	3.03E+00	2.30E+00	3.51E-01
Benzo(g,h,i)perylene	6.00E-01	2.05E-01	7.28E-01	6.00E-01	2.05E-01
Benzo(k)fluoranthene	4.05E-01	1.67E-01	1.09E+00	4.05E-01	1.67E-01
bis(2-Ethylhexyl)phthalate	3.00E+00	8.23E-01	2.91E+01	3.00E+00	8.23E-01
Chrysene	2.10E+00	3.18E-01	3.17E+00	2.10E+00	3.18E-01
Di-n-butyl phthalate	4.05E-01	1.86E-01	1.88E+00	4.05E-01	1.86E-01
Di-n-octyl phthalate	4.05E-01	2.15E-01	4.77E-01	4.05E-01	2.15E-01
Dibenzofuran	2.70E-01	2.16E-01	2.38E-01	2.38E-01	2.16E-01
Fluoranthene	4.40E+00	7.17E-01	7.29E+00	4.40E+00	7.17E-01
Indeno(1,2,3-cd)pyrene	6.30E-01	2.08E-01	7.38E-01	6.30E-01	2.08E-01
Phenanthrene	4.60E+00	6.13E-01	6.63E+00	4.60E+00	6.13E-01
Pyrene	3.60E+00	4.89E-01	1.95E+01	3.60E+00	4.89E-01
Volatile Oragnics					
2-Butanone (MEK)	7.00E-02	1.93E-02	6.96E-02	6.96E-02	1.93E-02
Acetone	7.00E-01	1.12E-01	1.64E+01	7.00E-01	1.12E-01
Acrylonitrile	3.50E-02	7.93E-03	2.67E-02	2.67E-02	7.93E-03
Carbon disulfide	3.50E-02	5.94E-03	1.05E+03	3.50E-02	5.94E-03
Chlorobenzene	3.50E-02	6.73E-03	9.19E+02	3.50E-02	6.73E-03
Methylene chloride	1.10E+00	1.24E-01	2.14E+04	1.10E+00	1.24E-01
Toluene	6.00E-01	1.98E-02	1.08E-02	1.08E-02	1.08E-02

Note:

a. Surface (0-0.5 feet) sediments data are used in the calculations.

b. One half of the detection limit is used for all non-detects when calculating values.

c. The upper 95 percent confidence limit values (UCL) of the arithmetic mean concentration assuming lognormal distribution.

d. The concentration associated with the 95 percent UCL or the maximum concentration detected, whichever was lower was used as the RME exposure point concentration.

e. The RME exposure point concentration or the mean concentration, whichever was lower, was adopted as the average exposure point concentration.

TABLE 3-15

EXPOSURE POINT CONCENTRATIONS
OFF-BASE EAST SOLDIER CREEK SEDIMENTS
(FUTURE SCENARIO)

Chemical	Maximum Detected Concentration (mg/kg)	Mean[a,b] (mg/kg)	UCL[a,b,c] (mg/kg)	RME Exposure Point Conc. [c] (mg/kg)	Average Exposure Point Conc. [d] (mg/L)
Antimony	4.50E+00	3.72E+00	3.82E+00	3.82E+00	3.72E+00
Beryllium	6.00E-01	3.03E-01	4.78E-01	4.78E-01	3.03E-01
Cadmium	1.23E+02	1.43E+01	3.55E+02	1.23E+02	1.43E+01
Cobalt	1.46E+01	4.86E+00	5.85E+00	5.85E+00	4.86E+00
Lead	1.07E+02	1.79E+01	3.75E+01	3.75E+01	1.79E+01
Mercury	6.00E-01	1.25E-01	1.64E-01	1.64E-01	1.25E-01
Nickel	3.47E+02	5.40E+01	1.21E+02	1.21E+02	5.40E+01
Silver	1.94E+01	2.54E+00	4.95E+00	4.95E+00	2.54E+00
Thallium	9.00E+00	9.01E-01	1.09E+00	1.09E+00	9.01E-01
Vanadium	2.51E+01	1.79E+01	2.03E+01	2.03E+01	1.79E+01
PCBs/Pesticides					
Aldrin	8.60E-02	1.18E-02	4.01E-02	4.01E-02	1.18E-02
alpha-BHC	2.00E-03	6.78E-03	8.00E-03	2.00E-03	2.00E-03
alpha-Chlordane	9.10E-01	4.13E-02	7.48E-02	7.48E-02	4.13E-02
Aroclor 1254	9.70E+00	7.21E-01	2.25E+01	9.70E+00	7.21E-01
Heptachlor	9.70E-01	7.98E-02	2.17E+00	9.70E-01	7.98E-02
Semivolatile organics					
1-Chloronaphthalene	1.30E+00	1.45E+00	2.38E+00	1.30E+00	1.30E+00
2-Chloronaphthalene	6.90E-02	1.34E-01	4.59E-01	6.90E-02	6.90E-02
2-Methylnaphthalene	1.10E-01	1.97E-01	2.10E-01	1.10E-01	1.10E-01
3/4-Methylphenol	1.60E-01	2.11E-01	2.27E-01	1.60E-01	1.60E-01
Acenaphthene	5.40E-01	2.20E-01	2.41E-01	2.41E-01	2.20E-01
Anthracene	7.90E-01	1.51E-01	5.34E-01	5.34E-01	1.51E-01
Benzo(a)anthracene	1.50E+00	1.70E-01	5.78E-01	5.78E-01	1.70E-01
Benzo(a)pyrene	1.30E+00	1.84E-01	6.57E-01	6.57E-01	1.84E-01
Benzo(b)fluoranthene	2.30E+00	2.15E-01	7.20E-01	7.20E-01	2.15E-01
Benzo(g,h,i)perylene	6.00E-01	1.63E-01	6.52E-01	6.00E-01	1.63E-01
Benzo(k)fluoranthene	6.70E-01	1.49E-01	5.51E-01	5.51E-01	1.49E-01
bis(2-Ethylhexyl)phthalate	4.50E+00	5.98E-01	4.84E+00	4.50E+00	5.98E-01
Chrysene	2.10E+00	1.95E-01	6.10E-01	6.10E-01	1.95E-01
Di-n-butyl phthalate	3.40E-02	1.45E-01	3.87E-01	3.40E-02	3.40E-02
Di-n-octyl phthalate	7.70E-02	1.99E-01	2.48E-01	7.70E-02	7.70E-02
Dibenzofuran	2.70E-01	2.06E-01	2.13E-01	2.13E-01	2.06E-01
Fluoranthene	4.40E+00	4.38E-01	1.67E+00	1.67E+00	4.38E-01
Indeno(1,2,3-cd)pyrene	6.30E-01	1.60E-01	6.36E-01	6.30E-01	1.60E-01
Phenanthrene	4.60E+00	2.72E-01	6.93E-01	6.93E-01	2.72E-01
Pyrene	3.60E+00	3.11E-01	2.59E+00	2.59E+00	3.11E-01
Volatile Oragnics					
2-Butanone (MEK)	1.50E-02	1.01E-02	1.28E-02	1.28E-02	1.01E-02
Acetone	7.00E-02	2.40E-02	3.98E-02	3.98E-02	2.40E-02
Acrylonitrile	4.50E-03	5.89E-02	1.72E-01	4.50E-03	4.50E-03
Carbon disulfide	2.10E-02	6.77E-03	9.47E-03	9.47E-03	6.77E-03
Chlorobenzene	7.00E-03	3.64E-03	7.69E-03	7.00E-03	3.64E-03
Methylene chloride	8.50E-03	3.85E-03	6.95E-03	6.95E-03	3.85E-03
Toluene	1.10E+00	4.61E-02	1.89E-01	1.89E-01	4.61E-02

Note.

a. Sediment data collected from 0 - 5.0 feet depth are used in the calculations.

b. One half of the detection limit is used for all non-detects when calculating values.

c. The upper 95 percent confidence limit values (UCL) of the arithmetic mean concentration assuming lognormal distribution.

d. The concentration associated with the 95 percent UCL or the maximum concentration detected, whichever was lower was used as the RME exposure point concentration.

e. The RME exposure point concentration or the mean concentration, whichever was lower, was adopted as the average exposure point concentration.

4.0
TOXICITY ASSESSMENT

In general, the chemicals of concern identified in West and East Soldier Creeks consist of volatile and semivolatile organic compounds, PCBs, pesticides, and metals. The toxicity assessment provides the critical toxicity values (CTVs) for the COCs. The CTVs are values developed by the EPA that are used to evaluate potential cancer risks and non-carcinogenic health hazards associated with chemical exposure.

4.1 TOXICITY ASSESSMENT OF NON-CARCINOGENIC EFFECTS

The non-carcinogenic CTV is known as the reference dose (RfD). Reference doses are based on the premise that non-carcinogenic (i.e., toxic) effects exhibit a threshold. As long as the chronic daily intake (CDI) of a compound is less than the reference dose, no non-carcinogenic health effect is believed to be posed by the exposure. Reference doses are developed using human and animal studies, and incorporate safety factors to ensure health protection in the most sensitive population.

Substances that produce non-carcinogenic effects are generally thought to have a threshold below which there are no observable adverse health effects. This threshold does, also known as no-observed-adverse-effect level (NOAEL), is the highest level (determined in epidemiologic studies or animal studies) at which there is no statistically or biologically significant effects of concern, often called the "critical toxic effect". For certain substances, only a LOAEL, or "lowest-observed-adverse-effect level," has been determined. This is the lowest dose of a substance that produces either a statistically or biologically significant indication of the critical toxic effect. The NOAEL or the LOAEL may be used to calculate the RfD (reference dose) of a particular chemical.

RfDs are calculated by dividing the NOAEL (or LOAEL) by uncertainty factors, which generally range from 10 to 1,000. For example, uncertainties include variations in the sensitivity of individuals within a population and the extrapolation of data from experimental animals to humans. The RfD is expressed in units of milligrams of chemical per kilogram of body weight per day (mg/kg-day) for oral exposure.

Dermal RfDs can be derived from oral RfDs by adjusting the oral value to account for the percent of gastrointestinal absorption associated with the study used to derive the RfD (i.e., converting the oral RfD from an "administered" to an "absorbed" dose). However, this approach is not currently recommended by EPA's Environmental Criteria Assessment Office (ECAO) because absorption efficiency is unknown for most compounds (ECAO, 1993). ECAO currently recommends use of oral RfDs to evaluate dermal exposure, although it should be noted that this approach may lead to an underestimation of dermal risk for some compounds (ECAO, 1993). The methodology for deriving RfDs is more fully described in RAGS (EPA, 1989a).

The EPA defines a chronic RfD as an estimate of a daily exposure level for the human population that is unlikely to result in deleterious effects during a lifetime (i.e., 70 years according to EPA guidance). A chronic RfD is used to evaluate the potential non-carcinogenic hazards associated with long-term chemical exposures (7 years to a lifetime). Chronic RfDs for the COCs are shown in **Table 4-1**. For the ingestion route, the RfD is for the administered dose (assuming 100 percent absorption by the gastrointestinal tract) unless otherwise noted. This assumption enhances the conservatism of the risk assessment since many chemicals in the environment are not readily absorbed by the gastrointestinal tract. RfDs have also been developed from many of the carcinogens to account for their non-carcinogenic effects.

The potential for non-carcinogenic effects to occur as a result of exposure is evaluated by comparing the exposure level, or daily chemical intake, over a specified time period (e.g., subchronic or chronic) with a RfD derived for a similar exposure period. A Hazard Quotient (HQ) is derived for each chemical as follows:

$$HQ = [Average\ Daily\ Intake] / [RfD]$$

If exposure is equivalent to or less than the RfD, the HQ will be 1.0 or less, which represents an intake level unlikely to be associated with potential adverse effect due to the chemical. If exposure exceeds the RfD, the resulting HQ will exceed 1.0, and it will be concluded that a hazard may exist. For each non-carcinogenic chemical of potential concern specific to each

exposure pathway, a HQ will be derived. HQs for each chemical are then summed for each exposure pathway to derive a value referred to as a Hazard Index (HI):

$$HI = HQ_1 + HQ_2 + HQ_3 \cdots\cdots\cdots = HQ_n$$

HIs greater than 1.0 are generally viewed as indicating that exposure to a particular medium identified in the exposure scenario represents a potential human health hazard. Exposure pathway HIs are summed across pathways whenever appropriate, since individuals may be simultaneously exposed to chemicals via more than one pathway (e.g., to both soil and surface water).

4.2 TOXICITY ASSESSMENT OF CARCINOGENIC EFFECTS

The carcinogenic CTV is termed the slope factor (SF). Slope factors are developed based on a dose-response curve for carcinogenicity of the specific chemicals. As with RfD values, slope factors are developed from human and animal studies and are designed to be health protective (i.e., to overestimate the actual risks). The SF is used to estimate an upperbound probability of an individual developing cancer as a result of exposure to a potential carcinogen. Carcinogens with EPA-derived slope factors are also given an EPA weight-of-evidence classification whereby potential carcinogens are grouped according to the likelihood that the chemical is a human carcinogen, depending on the quality and quantity of carcinogenic potency data for a given chemical. **Table 4-2** presents the EPA weight-of-evidence classification system.

In estimating the risk posed by potential carcinogens, it is the common practice of the EPA and other regulatory agencies to assume that any exposure level is associated with a finite probability, however minute, of producing a carcinogenic response. EPA assumes that a small number of molecular events can evoke changes in a single cell that can lead to uncontrolled cellular proliferation. This mechanism for carcinogenicity is referred to as "non-threshold" since there is theoretically no level of exposure for such a substance that does not pose a small, though finite, probability of producing a carcinogenic response.

Slope factors are based primarily on the results of animal studies. There is uncertainty whether all animal carcinogens are also carcinogenic in humans. While many chemical substances are carcinogenic in one or more animal species, only a number of chemical substances are known to be human carcinogens. The EPA assumes that humans are as sensitive to all animal carcinogens as the most sensitive animal species. This policy decision is designed to prevent underestimating risk and introduces the potential to overestimate carcinogenic risk.

It is generally assumed by EPA in developing SFs that the risk of cancer is linearly related to dose. A linearized multistage model is one of the most commonly used models by EPA for low-dose extrapolation of experimentally derived data to the low dose range. This conservative mathematical model is based on the multi-stage theory of carcinogenesis wherein the response is assumed to be linear at low doses. From the slope of the extrapolation curve estimated by the model, the EPA calculates the upper 95th percent confidence limit of the slope. This value, the slope factor (SF), expressed in units of $(mg/kg\text{-}day)^{-1}$, is used to convert the average daily intake of chemical, normalized over a lifetime, directly to a cancer risk. This represents an estimation of an upperbound incremental lifetime probability that an individual will develop cancer as a result of exposure to a potential carcinogen. This model provides a conservative estimate of cancer risk at low doses, and is likely to overestimate the actual cancer risk. The EPA acknowledges that actual slope factors are likely to be between zero and the estimate provided by the linearized multistage model (EPA; 1989a). The slope factors and weight-of-evidence classifications for the COCs are included in **Table 4-1**.

Risks associated with individual COCs can be derived by multiplying the SF and the estimated chronic daily intake (i.e., average daily intake for entire lifetime) for each exposure pathway as follows:

$$\textit{Risk Estimate} = \textit{Chronic Daily Intake} \times \textit{Slope Factor}$$

An overall risk estimate for each exposure scenario can be calculated by combining the risk estimates for individual chemicals and exposure routes. Risk estimates are then compared

with EPA's acceptable risk range of 1×10^{-4} (1 in 10,000) to 1×10^{-6} (1 in 1,000,000) incremental excess lifetime cancer risk (NCP, 1990).

4.3 SOURCES OF CRITICAL TOXICITY VALUES

The RfD and SF values listed in the present risk assessment were obtained from the following sources:

- EPA's Integrated Risk Information System (EPA, 1995) on-line database system;
- EPA's Health Effects Assessment Summary Tables (EPA, 1992b and 1994) ;
- EPA Region III Risk-Based Concentration Table (EPA Region III, 1994) and
- Drinking Water Regulation and Health Advisories (EPA, May 1995)

Available RfDs and SFs for each COC are presented in **Table 4-1**.

TABLE 4-1

CRITICAL TOXICITY VALUES

Chemical Name	Cancer Class	Oral RfD mg/kg-day	Oral SF $(mg/kg\text{-}day)^{-1}$
1,2,4-Trichlorobenzene	D	1.00E-02 [a]	
1,2-Dichlorobenzene	D	9.00E-02 [a]	
1,3-Dichlorobenzene	D	8.90E-02 [g]	
1,4-Dichlorobenzene	C		2.40E-02 [b]
1-Chloronaphthalene		3.00E-02 [a,j]	
2,4-Dimethylphenol		2.00E-02 [a]	
2-Butanone (MEK)	D	6.00E-01 [g]	
2-Chloronaphthalene		8.00E-02 [a]	
2-Methylnaphthalene	D	3.00E-02 [a,j]	
3/4 Methylphenol	C	5.00E-02 [a,c]	
4-Nitrophenol	D	8.00E-03 [j]	
Acenaphthene		6.00E-02 [a]	
Acenaphthylene		3.00E-02 [a,j]	
Acetone	D	1.00E-01 [a]	
Acrylonitrile	B1	1.00E-03 [b]	5.40E-01 [a]
Aldrin	B2	3.00E-05 [a]	1.70E+01 [a]
alpha-BHC	B2		6.30E+00 [a]
alpha-Chlordane	B2	6.00E-05 [a]	1.30E+00 [a]
Anthracene		3.00E-01 [a]	
Antimony	D	4.00E-04 [a]	
Aroclor 1254	B2	2.00E-05 [a]	
Arsenic	A	3.00E-04 [a]	1.50E+00 [a]
Benzene	A		2.90E-02 [a]
Benzidine	A	3.00E-03 [a]	2.30E+02 [a]
Benzo(a)anthracene	B2		7.30E-01 [h]
Benzo(a)pyrene	B2		7.30E+00 [a]
Benzo(b)fluoranthene	B2		7.30E-01 [h]
Benzo(g,h,i)perylene		3.00E-02 [a,j]	
Benzo(k)fluoranthene	B2		7.30E-02 [a,h]
Benzoic acid		4.00E+00 [a]	
Benzyl alcohol		3.00E-01 [g]	
Beryllium	B2	5.00E-03 [a]	4.30E+00 [a]
Bis(2-ethylhexyl) phthalate	B2		1.40E-02 [a]
Bromoform	B2	2.00E-02 [a]	7.90E-03 [a]
Butyl benzyl phthalate	C	2.00E-01 [a]	
Cadmium (Food)	B1	1.00E-03 [a]	
Cadmium (water)	B1	5.00E-04 [a]	
Carbon disulfide		1.00E-01 [a]	
Chlorobenzene		2.00E-02 [a]	
Chloroform	B2	1.00E-02 [a]	6.10E-03 [a]
Chloromethane	B2		1.30E-02 [b]
Chromium (III)	D	1.00E+00 [a]	
Chromium (IV)	A	5.00E-03 [a]	
Chrysene	B2		7.30E-03 [a,h]

TABLE 4-1

CRITICAL TOXICITY VALUES

Chemical Name	Cancer Class	Oral RfD mg/kg-day	Oral SF $(mg/kg\text{-}day)^{-1}$
Cobalt		6.00E-02 [g]	
delta-BHC	D		
Di-n-butyl phthalate	D	1.00E-01 [a]	
Di-n-octyl phthalate		2.00E-02 [g]	
Dibenz(a,h)anthracene	B2		7.30E+00 [a,h]
Dibenzofuran		4.00E-03 [g]	
Dimethyl phthalate	D	1.00E+01 [b]	
Ethylbenzene	D	1.00E-01 [a]	
Fluoranthene		4.00E-02 [a]	
Fluorene		4.00E-02 [a]	
Heptachlor	B2	5.00E-04 [a]	4.50E+00 [a]
Indeno(1,2,3-cd)pyrene	B2		7.30E-01 [a,h]
Lead	B2		
Mercury	D	3.00E-04 [g]	
Methylene chloride	B2	6.00E-02 [a]	7.50E-03 [a]
Molybdenum	D	5.00E-03 [b]	
N-Nitroso-di-n-propylamine	B2		7.00E+00 [a]
Naphthalene		3.00E-02 [a,i]	
Nickel	A	2.00E-02 [b,e]	
Phenanthrene		3.00E-02 [a,i]	
Phenol	D	6.00E-01 [a]	
Pyrene	D	3.00E-02 [a]	
Silver	D	5.00E-03 [a]	
Tetrachloroethene		1.00E-02 [a]	
Thallium		8.00E-05 [c,f]	
Toluene	D	2.00E-01 [a]	
trans-1,2-Dichloroethene	D	2.00E-02 [a]	
Trichloroethene	B2	6.00E-03 [g]	1.10E-02 [g]
Vanadium	D	7.00E-03 [b]	
Vinyl chloride	A		1.90E+00 [b]
Xylenes (total)	D	2.00E+00 [a]	

Note:

a). EPA's Integrated Risk Information System (USEPA, December 1995) on-line database system.

b). EPA's Health Effects Assessment Summary Tables (USEPA, 1994)

c). EPA's Health Effects Assessment Summary Tables (USEPA, 1992b)

d). Data Inadequate For Quantitative Risk Assessment

e). Subchronic value is used.

f). RfD value for Thallium (I) chloride is used.

g). EPA, Region III (1994).

h). Based on the slope factor of Benzo(a)pyyrene x Carcinogenic Equivalency Factor (EPA,1993).

i). The RfD value for pyrene is assumed as the surrogate RfD value for non-carcinogenic PAHs.

j). Drinking Water Regulation and Health Advisories (EPA, May 1995).

TABLE 4-2

USEPA WEIGHT-OF-EVIDENCE CARCINOGENIC CLASSIFICATION OF CHEMICALS

Group	Description	Description of Evidence
A	Human carcinogen	Sufficient evidence from epidemiologic studies to support a causal association between exposure and cancer.
B1 or B2	Probable human carcinogen	B1 indicates that limited human data are available from epidemiologic studies. B2 indicates sufficient evidence in animals and inadequate or no evidence in humans of carcinogenicity.
C	Possible human carcinogen	Limited evidence of carcinogenicity in animals.
D	Not classifiable as to human carcinogenicity	Inadequate evidence of carcinogenicity in animals.
E	No evidence of carcinogenicity in humans	No evidence of carcinogenicity in at least two adequate animal tests or in both epidemiologic and animal studies.

Note: Substances in groups B and C are considered potential carcinogens.

5.0
CHARACTERIZATION OF POTENTIAL CANCER RISKS AND NON-CARCINOGENIC HAZARDS

5.1 PROCEDURE FOR CALCULATION OF POTENTIAL CANCER RISKS AND NON-CARCINOGENIC HAZARDS

The purpose of the risk characterization is to estimate the potential health risks associated with site chemicals. The potential health risks for each compound and exposure pathway are estimated in this Section of the risk assessment. These risk estimates are calculated using the intake parameters developed in the exposure assessment (**Tables 3-1**, **3-2**, **3-3** and **3-4**), the estimated exposure point concentrations (**Tables 3-5** to **3-14**), and the CTVs reported in the toxicity assessment (**Table 4-1**). The Chronic Daily Intake (CDI) calculations are discussed in **Section 3-6** and are presented in **Appendix A**. It should be noted that the CDIs used for calculating hazard quotients (HQs) are different from those used to estimate cancer risks (CRs). The CDIs used to calculate HQs are developed using the exposure period as an averaging period, while the CDIs used to calculate potential CRs assume lifetime as the averaging period. The approach for carcinogens is based on the assumption that a high dose received over a short period of time is equivalent to a low dose spread over a life-time, while the approach used for non-carcinogens assumes that chemical effects are only relevant during the period of exposure. The CDIs and their corresponding risks and hazards were calculated for each chemical, using the arithmetic mean concentration to evaluate average exposure and the RME concentration to evaluate upperbound exposure.

As discussed in **Section 4.0**, the potential non-carcinogenic health hazard is calculated for each compound as the ratio of CDI and respective reference dose (RfD). The ratio is termed the Hazard Quotient (HQ). The concept of HQ is based on the assumption that most toxicological effects of chemicals occur only after a threshold dose is achieved. The RfD for a compound is an estimate of the threshold concentration for the most sensitive human population associated with the lowest observed adverse effect for that compound. An HQ is excess of 1.0 indicates that the threshold has been exceeded and a potential health hazard may exist, while a value of less than 1.0 indicates the absence of a health hazard.

The summation of HQs for all compounds is termed the Hazard Index (HI). The assumption of additivity of sub-threshold HQ values in calculating an HI is only valid when the following conditions are met:

- All compounds affect the same target organ.
- There are no antagonistic or synergistic effects between compounds (little is known about these interactions for most chemicals).

The first assumption is not true for many chemicals, while the second assumption represents a major source of uncertainty. Assuming that no synergistic effects occur, the assumption of additivity does not appear to be valid for all compounds. The use of an HI in this RA should be considered highly conservative, and will likely overestimate the potential for a health hazard.

Potential cancer risks are calculated for each compound as the arithmetic product of the CDI and the respective slope factor (SF). The estimated cancer risk for each compound may be summed to yield an overall cancer risk for each scenario. The basis for this approach is the regulatory assumption that cancer risks are additive (RAGS; USEPA, 1989a). This approach is very conservative and likely to overestimate the true cancer risks associated with exposure to the chemicals of concern.

5.2 SUMMARY OF POTENTIAL NON-CARCINOGENIC HEALTH HAZARD AND CANCER RISKS

The calculation of individual HQs and cancer risks for each receptor, exposure route and compound are presented in Appendix A and are summarized in **Tables 5-1** and **5-2**.

Both average exposure and RME hazard indices are less than the threshold value of 1.0 for all exposure scenarios and stream segments studied in this RA. This indicates that surface water and sediments in both West and East Soldier Creeks should not pose a non-carcinogenic health hazard to any on-base or off-base populations under current or future stream use conditions.

As shown on **Tables 5-1** and **5-2**, potential cancer risks associated with all scenarios are less than the baseline risk level of 10^{-4} established by USEPA for identifying sites that require remedial action (OSWER Directive 9355.0-30, April 22, 1991c). These results indicate that exposure to surface water and sediments in West and East Soldier Creeks are not likely to result in an unacceptable cancer risk for any on-base or off-base populations under current or future stream use conditions.

Table 5-1

NON-CARCINOGENIC HEALTH HAZARDS AND CARCINOGENIC RISKS ASSOCIATED WITH SURFACE WATER AND SEDIMENTS IN SOLDIER CREEK (CURRENT SCENARIO)

	ON-BASE WORKER				OFF-BASE RESIDENT [a]			
	AVERAGE		RME		AVERAGE		RME	
	HAZARD INDEX	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX	CANCER RISK
ON-BASE WEST SOLDIER CREEK (AREA 1)								
SURFACE WATER INGESTION	5.60E-06	5.14E-10	2.47E-04	5.56E-08	NA	NA	NA	NA
SURFACE WATER DERMAL EXPOSURE	4.27E-06	1.44E-09	4.50E-04	3.60E-07	NA	NA	NA	NA
SEDIMENT INGESTION[b]	6.31E-05	2.96E-08	1.34E-02	4.62E-06	NA	NA	NA	NA
SEDIMENTS DERMAL EXPOSURE[b]	1.68E-05	1.18E-08	2.34E-02	9.03E-06	NA	NA	NA	NA
TOTAL	8.98E-05	4.34E-08	3.75E-02	1.41E-05	NA	NA	NA	NA
OFF-BASE WEST SOLDIER CREEK (AREA 2)								
SURFACE WATER INGESTION	NA	NA	NA	NA	5.28E-05	4.57E-09	2.20E-04	3.78E-08
SURFACE WATER DERMAL EXPOSURE	NA	NA	NA	NA	1.29E-04	3.31E-09	9.30E-04	4.96E-08
SEDIMENT INGESTION[b]	NA	NA	NA	NA	6.18E-03	1.77E-07	2.61E-02	1.82E-06
SEDIMENTS DERMAL EXPOSURE[b]	NA	NA	NA	NA	1.74E-04	5.95E-09	7.25E-03	5.86E-07
TOTAL	NA	NA	NA	NA	6.53E-03	1.91E-07	3.45E-02	2.49E-06
ON-BASE EAST SOLDIER CREEK (AREA 3)								
SURFACE WATER INGESTION	1.51E-05	1.21E-10	5.39E-04	1.54E-08	NA	NA	NA	NA
SURFACE WATER DERMAL EXPOSURE	1.91E-05	1.53E-10	1.94E-03	1.53E-10	NA	NA	NA	NA
SEDIMENT INGESTION[b]	1.52E-04	1.02E-07	1.78E-02	1.58E-05	NA	NA	NA	NA
SEDIMENTS DERMAL EXPOSURE[b]	5.29E-05	4.09E-08	6.48E-03	2.50E-05	NA	NA	NA	NA
TOTAL	2.39E-04	1.43E-07	2.68E-02	4.09E-05	NA	NA	NA	NA
OFF-BASE EAST SOLDIER CREEK (AREA 4)								
SURFACE WATER INGESTION	NA	NA	NA	NA	2.46E-03	5.22E-08	9.21E-03	4.19E-07
SURFACE WATER DERMAL EXPOSURE	NA	NA	NA	NA	7.85E-04	2.26E-08	1.76E-03	1.19E-07
SEDIMENT INGESTION[b]	NA	NA	NA	NA	5.80E-03	3.07E-07	1.43E-01	1.29E-06
SEDIMENTS DERMAL EXPOSURE[b]	NA	NA	NA	NA	1.00E-04	3.77E-08	2.01E-03	2.76E-06
TOTAL	NA	NA	NA	NA	9.15E-03	4.20E-07	1.56E-01	4.59E-06

Note:

a. The hazard indices or cancer risk associated with both adult and child resident

b. Surface (0-0.5 feet) sediments data are used in the calculations.

Table 5-2

NON-CARCINOGENIC HEALTH HAZARDS AND CARCINOGENIC RISKS ASSOCIATED WITH SURFACE WATER AND SEDIMENTS IN SOLDIER CREEK (FUTURE SCENARIO)

	ON-BASE WORKER				OFF-BASE RESIDENT [a]			
	AVERAGE		RME		AVERAGE		RME	
	HAZARD INDEX	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX	CANCER RISK	HAZARD INDEX	CANCER RISK
ON-BASE WEST SOLDIER CREEK (AREA 1)								
SURFACE WATER INGESTION	5.60E-06	5.14E-10	2.47E-04	5.56E-08	NA	NA	NA	NA
SURFACE WATER DERMAL EXPOSURE	4.27E-06	1.44E-09	4.50E-04	3.60E-07	NA	NA	NA	NA
SEDIMENT INGESTION[b]	8.26E-05	3.22E-09	1.46E-02	4.35E-07	NA	NA	NA	NA
SEDIMENTS DERMAL EXPOSURE[b]	2.43E-05	1.25E-09	2.63E-02	8.25E-07	NA	NA	NA	NA
TOTAL	1.17E-04	6.42E-09	4.16E-02	1.68E-06	NA	NA	NA	NA
OFF-BASE WEST SOLDIER CREEK (AREA 2)								
SURFACE WATER INGESTION	NA	NA	NA	NA	5.28E-05	4.57E-09	2.20E-04	3.78E-08
SURFACE WATER DERMAL EXPOSURE	NA	NA	NA	NA	1.29E-04	3.31E-09	9.30E-04	4.96E-08
SEDIMENT INGESTION[b]	NA	NA	NA	NA	6.18E-03	1.77E-07	2.61E-02	1.82E-06
SEDIMENTS DERMAL EXPOSURE[b]	NA	NA	NA	NA	1.74E-04	5.95E-09	7.25E-03	5.86E-07
TOTAL	NA	NA	NA	NA	6.53E-03	1.91E-07	3.45E-02	2.49E-06
ON-BASE EAST SOLDIER CREEK (AREA 3)								
SURFACE WATER INGESTION	1.51E-05	1.21E-10	5.39E-04	1.54E-08	NA	NA	NA	NA
SURFACE WATER DERMAL EXPOSURE	1.91E-05	1.53E-10	1.94E-03	1.88E-07	NA	NA	NA	NA
SEDIMENT INGESTION[b]	1.18E-04	7.75E-08	7.78E-03	1.00E-05	NA	NA	NA	NA
SEDIMENTS DERMAL EXPOSURE[b]	3.73E-05	3.10E-08	1.28E-02	1.97E-05	NA	NA	NA	NA
TOTAL	1.89E-04	1.09E-07	2.30E-02	2.99E-05	NA	NA	NA	NA
OFF-BASE EAST SOLDIER CREEK (AREA 4)								
SURFACE WATER INGESTION	NA	NA	NA	NA	2.46E-03	5.22E-08	9.21E-03	4.19E-07
SURFACE WATER DERMAL EXPOSURE	NA	NA	NA	NA	7.85E-04	2.26E-08	1.76E-03	1.19E-07
SEDIMENT INGESTION[b]	NA	NA	NA	NA	8.73E-03	8.35E-08	3.85E-02	7.75E-06
SEDIMENTS DERMAL EXPOSURE[b]	NA	NA	NA	NA	6.12E-04	7.61E-09	4.08E-02	4.06E-07
TOTAL	NA	NA	NA	NA	1.26E-02	1.66E-07	9.03E-02	8.70E-06

Note:

a. The hazard indices or cancer risk associated with both adult and child resident

b. Sediment data collected from 0 - 5.0 feet depth are used in the calculations.

6.0
REMEDIAL ACTION OBJECTIVES

The establishment of health-based Remedial Action Objectives (RAOs) (i.e., "cleanup goals") serves as an important means of guiding remedial activities. In general, development of health-based RAOs is warranted whenever a site is found to pose an unacceptable risk to either human health or the environment, and "cleanup" standards promulgated by state or federal agencies are not available. The approach used to develop health-based cleanup goals is derived from the risk assessment process, which is a process whereby the magnitude of potential cancer risks and other health effects associated with site contaminants can be evaluated quantitatively. A human health-based cleanup goal is established by "back-calculating" a health protective contaminant concentration, given a target risk which is deemed acceptable and using realistic intake factors to represent potentially exposed populations.

The approach used in this document to develop cleanup goals incorporates reasonable maximum exposure (RME) assumptions and reasonable site use scenarios so that residual risks posed by the site after corrective action are within a health-protective range. It is important to note that, since the RME is meant to represent the most exposed individual in a population, the estimates provided herein are conservative. That is, because cleanup goals developed using RME assumptions are health-protective of the most exposed individual in a population, they will be health-protective for all potentially exposed individuals within that population.

The approach used to calculate RAOs in this document is the same as that used in the Baseline Risk Assessment (B&V, 1993). Risk-based RAOs were calculated for each chemical using the most conservative exposure scenario, that is, the scenario associated with the largest risk or hazard. For COCs found off-base, the largest risks and hazards were associated with residential exposure scenarios. For COCs found only in the on-base portions of the creek, the construction worker scenario is the only applicable scenario, and thus was used to calculate RAOs.

Human health RAOs are calculated based on both the carcinogenic and non-carcinogenic properties of the COCs. Four sets of human health RAOs are developed in this risk assessment.

For carcinogens, RAOs were calculated based on target risk levels of 10^{-6} (one in a million), 10^{-5} (one in one hundred thousand), and 10^{-4} (one in ten thousand). These three values encompass the acceptable risk range of 10^{-6} to 10^{-4} identified by EPA. For non-carcinogens, RAOs were calculated based on a target Hazard Index of 1.0. The equations used to calculate RAOs, as originally presented in B&V (1993), are presented below. These equations were used to preserve continuity between the baseline risk assessment prepared by B&V (1993) and this current risk assessment.

For Carcinogens

RAO = (Risk Assessment Concentration/Calculated Risk) (Target Risk)

For Non-Carcinogens

RAO = (Risk Assessment Concentration/Calculated Hazard) (Target Hazard)

where

Risk Assessment Concentration = The chemical exposure point concentration used in the risk assessment

Calculated Risk = The highest calculated risk associated with the exposure point concentration

Target Risk = 10^{-6}, 10^{-5}, and 10^{-4}

Calculated Hazard = The highest calculated hazard associated with the exposure point concentration

Target Hazard = 1.0

The RAOs for chemicals in sediment are summarized in **Table 6-1**. For chemicals with both carcinogenic and non-carcinogenic RAOs, the lower level of these values is the health-protective value. Because surface water in the creek is a dynamic medium that is constantly changing, it is inappropriate to develop RAOs for chemicals in surface water. However, by using the same approach in calculating the RAOs, health-based indicators of water quality were developed for chemicals in surface water and are summarized in **Table 6-2**.

TABLE 6-1

RISK -BASED CLEANUP LEVELS
FOR CHEMICALS OF CONCERN IN SEDIMENTS

Chemical	RME [a] (mg/kg)	Total HQ [b]	Total Cancer Risk	Non-carcinogenic [c] Action Level (mg/kg)	Carcinogenic [d] Action Level (Risk = 1 x 10^{-6}) (mg/kg)	Carcinogenic [d] Action Level (Risk = 1 x 10^{-5}) (mg/kg)	Carcinogenic [d] Action Level (Risk = 1 x 10^{-4}) (mg/kg)
1,2,4-Trichlorobenzene	4.30E-01	8.25E-07		5.21E+05			
1,2-Dichlorobenzene	5.07E-01	1.63E-07		1.00E+06 [e]			
1,3-Dichlorobenzene	2.79E+00	9.08E-07		1.00E+06 [e]			
1,4-Dichlorobenzene	2.10E-01		5.21E-11		4.03E+03	4.03E+04	4.03E+05
1-Chloronaphthalene	1.30E+00	1.31E-05		9.93E+04			
2,4-Dimethylphenol	3.50E-01	5.07E-07		6.91E+05			
2-Butanone (MEK)	6.66E-03	3.36E-09		1.00E+06 [e]			
2-Chloronaphthalene	6.90E-02	2.61E-07		2.65E+05			
2-Methylnaphthalene	1.10E-01	1.11E-06		9.93E+04			
3/4-Methylphenol	1.60E-01	9.67E-07		1.65E+05			
Acenaphthene	2.41E-01	1.21E-06		1.99E+05			
Acenaphthylene	3.90E+00	3.77E-06		1.00E+06 [e]			
Acetone	3.98E-02	1.20E-07		3.31E+05			
Acrylonitrile	4.50E-03	4.53E-05	9.91E-09	9.93E+01	4.54E-01	4.54E+00	4.54E+01
Aldrin	4.50E-02	4.53E-04	9.91E-08	9.93E+01	4.54E-01	4.54E+00	4.54E+01
alpha-BHC	2.00E-03		1.63E-09		1.23E+00	1.23E+01	1.23E+02
alpha-Chlordane	7.48E-02	3.77E-04	1.26E-08	1.99E+02	5.94E+00	5.94E+01	5.94E+02
Anthracene	7.50E-02	7.56E-08		9.93E+05			
Antimony	6.42E+00	3.69E-03		1.74E+03			
Aroclor 1254	1.70E+00	2.57E-02		6.62E+01			
Benzene	5.60E-03		1.68E-12		3.33E+03	3.33E+04	3.33E+05
Benzidine	1.19E+01	1.15E-04	2.83E-05	1.04E+05	4.20E-01	4.20E+00	4.20E+01
Benzo(a)anthracene	3.23E+00		3.05E-07		1.06E+01	1.06E+02	1.06E+03
Benzo(a)pyrene	1.52E+00		1.43E-06		1.06E+00	1.06E+01	1.06E+02
Benzo(b)fluoranthene	7.61E-01		7.19E-08		1.06E+01	1.06E+02	1.06E+03
Benzo(g,h,i)perylene	6.00E-01	6.04E-06		9.93E+04			
Benzo(k)fluoranthene	5.51E-01		5.21E-09		1.06E+02	1.06E+03	1.06E+04
Benzoic acid	1.70E-01	1.23E-09		1.00E+06 [e]			
Beryllium	5.61E-01	2.58E-05	2.38E-07	2.18E+04	2.36E+00	2.36E+01	2.36E+02
bis(2-Ethylhexyl)phthalate	4.90E+00		8.89E-09		5.51E+02	5.51E+03	5.51E+04
Butyl benzyl phthalate	3.70E-01	5.36E-08		1.00E+06 [e]			
Cadmium	1.23E+02	2.83E-02		4.35E+03			
Carbon disulfide	9.47E-03	2.86E-08		3.31E+05			
Chlorobenzene	7.00E-03	1.06E-07		6.62E+04			
Chromium	7.64E+02	8.94E-06		1.00E+06 [e]			

TABLE 6-1

RISK -BASED CLEANUP LEVELS
FOR CHEMICALS OF CONCERN IN SEDIMENTS

Chemical	RME [a] (mg/kg)	Total HQ [b]	Total Cancer Risk	Non-carcinogenic [c] Action Level (mg/kg)	Carcinogenic [d] Action Level (Risk = 1 x 10^{-6}) (mg/kg)	Carcinogenic [d] Action Level (Risk = 1 x 10^{-5}) (mg/kg)	Carcinogenic [d] Action Level (Risk = 1 x 10^{-4}) (mg/kg)
Chrysene	3.70E+00		3.50E-09		1.06E+03	1.06E+04	1.06E+05
Cobalt	8.22E+00	3.15E-05		2.61E+05			
delta-BHC	1.27E-01						
Di-n-butyl phthalate	3.40E-02	1.03E-07		3.31E+05			
Di-n-octyl phthalate	7.70E-02	1.16E-06		6.62E+04			
Dibenz(a,h)anthracene	1.70E-01		1.61E-07		1.06E+00	1.06E+01	1.06E+02
Dibenzofuran	2.13E-01	1.61E-05		1.32E+04			
Dimethyl phthalate	4.50E-02	1.36E-09		1.00E+06 [e]			
Ethylbenzene	1.30E-02	3.77E-09		1.00E+06 [e]			
Fluoranthene	5.30E+00	4.00E-05		1.32E+05			
Fluorene	1.71E+00	1.24E-06		1.00E+06 [e]			
Heptachlor	9.70E-01	5.86E-04	5.65E-07	1.65E+03	1.72E+00	1.72E+01	1.72E+02
Indeno(1,2,3-cd)pyrene	5.38E-01		5.09E-08		1.06E+01	1.06E+02	1.06E+03
Lead	1.62E+02						
Mercury	1.64E-01	1.26E-04		1.31E+03			
Methylene chloride	6.95E-03	3.50E-08	6.75E-12	1.99E+05	1.03E+03	1.03E+04	1.03E+05
Naphthalene	4.50E-01	4.34E-07		1.00E+06 [e]			
Nickel	2.09E+02	2.40E-03		8.71E+04			
Phenanthrene	7.27E-01	7.32E-06		9.93E+04			
Phenol	6.30E-02	3.17E-08		1.00E+06 [e]			
Pyrene	6.40E+00	6.45E-05		9.93E+04			
Silver	4.95E+00	2.28E-04		2.18E+04			
Tetrachloroethene	5.45E-03	1.58E-08		3.45E+05			
Thallium	1.09E+00	3.13E-03		3.48E+02			
Toluene	2.20E-03	3.32E-09		6.62E+05			
trans-1,2-Dichloroethene	1.50E-03	2.27E-08		6.62E+04			
Trichloroethene	1.07E-02	5.16E-08	1.22E-12	2.07E+05	8.79E+03	8.79E+04	8.79E+05
Vanadium	2.03E+01	6.66E-04		3.05E+04			
Vinyl chloride	5.66E-03		1.11E-10		5.09E+01	5.09E+02	5.09E+03
Xylenes (total)	3.25E-02	4.71E-10		1.00E+06 [e]			

Note a) RME = Reasonable Maximum Exposure Concentration
b) HQ = Hazard Quotient
c) Cleanup level = (Risk Assessment Conc HQ) x HI where HI = 1.0
d) Cleanup level = (Risk Assessment Conc Cancer risk) x Target cancer Risk
e) Calculated cleanup level is greater than 100% concentration and 100% concentration is assigned as the cleanup level

TABLE 6 - 2

RISK-BASED INDICATORS OF WATER QUALITY FOR CHEMICALS OF CONCENRN IN SURFACE WATER

Chemical	RME (mg/L)	Total HQ	Total Cancer Risk	Non-carcinogenic [a] Clean-up Level (mg/L)	Carcinogenic [b] Clean-up Level (Risk = 1 x 10^{-6}) (mg/L)	Carcinogenic [b] Clean-up Level (Risk = 1 x 10^{-5}) (mg/L)	Carcinogenic [b] Clean-up Level (Risk = 1 x 10^{-4}) (mg/L)
2-Butanone (MEK)	2.80E-03	3.65E-08		7.67E+04			
3/4-Methylphenol	1.70E-03	9.66E-06		1.76E+02			
4-Nitrophenol	2.00E-03	3.34E-05		5.99E+01			
Acetone	5.30E-03	1.64E-05		3.23E+02			
Aldrin	5.36E-05	7.82E-04	1.71E-07	6.85E-02	3.13E-04	3.13E-03	3.13E-02
Arsenic	1.40E-03	1.65E-03	3.18E-07	8.50E-01	4.41E-03	4.41E-02	4.41E-01
Benzoic acid	3.90E-03	7.63E-09		5.11E+05			
Benzyl alcohol	1.70E-03	4.44E-08		3.83E+04			
bis(2-Ethylhexyl)phthalate	3.60E-03	3.10E-04	3.72E-08	1.16E+01	9.67E-02	9.67E-01	9.67E+00
Bromoform	2.46E-03	9.64E-07	5.44E-11	2.56E+03	4.53E+01	4.53E+02	4.53E+03
Cadmium	2.64E-03	1.88E-03		1.40E+00			
Carbon disulfide	1.00E-03	1.60E-08		6.25E+04			
Chlorobenzene	1.80E-03	7.05E-07		2.56E+03			
Chloroform	1.80E-03	1.41E-06	3.07E-11	1.28E+03	5.86E+01	5.86E+02	5.86E+03
Cobalt	5.23E-03	3.10E-05		1.68E+02			
Fluoranthene	1.50E-03	2.94E-07		5.11E+03			
Methylene chloride	1.25E-02	6.44E-05	1.24E-08	1.94E+02	1.00E+00	1.00E+01	1.00E+02
Molybdenum	2.64E-01	1.22E-03		2.16E+02			
N-Nitroso-di-n-propylamine	1.80E-03		3.67E-07		4.91E-03	4.91E-02	4.91E-01
Nickel	2.99E-02	5.92E-04		5.06E+01			
Phenol	1.40E-03	3.12E-07		4.49E+03			
Tetrachloroethene	9.79E-03	7.66E-06		1.28E+03			
Thallium	1.20E-03	5.29E-03		2.27E-01			
Toluene	1.70E-03	6.65E-08		2.56E+04			
Trichloroethene	1.00E-02	1.31E-05	3.09E-10	7.67E+02	3.25E+01	3.25E+02	3.25E+03
Vanadium	6.66E-03	3.46E-04		1.92E+01			
Vinyl chloride	1.00E-03		5.31E-09		1.88E-01	1.88E+00	1.88E+01

Note: a). Cleanup level = (Risk Assessment Conc/HQ) x HI where HI = 1.0

b). Cleanup level = (Risk Assessment Conc Cancer risk) x Target Cancer Risk

7.0
UNCERTAINTY ANALYSIS

The USEPA guidance for risk assessment provides a systematic means for organizing, analyzing, and presenting information on the nature and magnitude of potential risks to public health posed by chemical exposures. Despite the advanced state of the current methodology, uncertainties and limitations are inherent in the risk assessment process. The uncertainty can lead to an over or under estimation of the risk. **Table 7-1** presents a qualitative assessment of factors which may contribute to uncertainty in the estimation of potential risks. Available data quality, incomplete information about existing conditions and future circumstances, as well as other factors discussed below contribute to these uncertainties and limitations.

This section discusses the following sources of uncertainties associated with the Soldier Creek risk assessment:

- Data collection and evaluation
- Exposure Assessment
- Toxicity assessment
- Risk characterization
- Remedial Action Objectives

7.1 DATA COLLECTION AND EVALUATION

7.1.1 Data Collection

Data used in this risk assessment were collected from Soldier Creek during four quarterly sampling events as part of a follow-up study to the RI/FS. These data are subject to uncertainty associated with sampling and analysis.

7.1.1.1 Sampling

In the risk assessment, it was assumed that samples collected were representative of areas where various populations may be exposed. However, collected samples may not be

completely representative due to biases in sampling, random variability, or sources of non-random variation, such as the annual precipitation cycle or periodic releases from on-base or off-base outfalls. These sources of bias or variability may result in either an over- or under-estimation of actual chemical concentrations, and thus, site risks.

7.1.1.2 Analysis

Samples were analyzed and subjected to data quality review procedures to assure that data were suitable for use in decision-making. However, it should be understood that sample analysis is subject to uncertainties associated with precision and accuracy and evaluated through laboratory quality assurance (QA) programs. Uncertainties associated with precision and accuracy of analysis are generally random. While these errors are typically of low magnitude compared to other sources of uncertainty in the risk assessment, they may lead to a possible over- or under-estimation of risk.

7.1.2 Data Evaluation

In accordance with EPA guidance, several inorganic chemicals present at background concentrations were removed from consideration as potential COCs because they are not site-related contaminants. This exclusion process was not extended to organic chemicals, because it is difficult to establish true background levels for most organics. None the less, it is likely that several of the organic chemicals identified as COCs are present at background levels, and are not site-related contaminants. Inclusion of these chemicals in the risk calculations will result in an over estimation of site-related risks.

7.2 EXPOSURE ASSESSMENT

The exposure assessment is based on a series of assumptions concerning concentrations of chemicals to which humans are exposed (exposure point concentrations) and patterns of behavior leading to exposure or intake of chemicals (exposure scenarios).

7.2.1 Exposure point concentrations

In compiling data for use in the risk assessment, arithmetic mean concentrations and 95 percentile upper confidence limit (UCL) on the mean concentrations were compiled for chemicals detected in each media. For RME exposure scenarios, the 95th percentile UCL concentrations were used to estimate risk. Because UCL concentrations are high end values, typically closer to maximum concentrations than to the arithmetic mean concentrations, use of UCL concentrations in the risk assessment will likely result in an over-estimation of potential risk.

For the most part, the arithmetic mean and 95th percentile UCL chemical concentrations found in the creek were used as exposure point concentrations. It was conservatively assumed that chemical concentrations observed at the creek will remain unchanged with time. The potential reduction in chemical concentrations by remedial action, migration, degradation, or attenuation were not considered in the current risk assessment. The use of existing chemical concentrations projected into the future may result in an over-estimation of potential health risks.

When calculating exposure point concentrations it was assumed that a chemical not detected in a given sample was actually present at one-half of its detection limit, if that chemical was present in any sample from that medium and stream segment. This approach, as described in RAGS, is a conservative approach that is likely to lead to an over-estimation of risk, particularly when the quantification limits are high (due to interferences or sample dilution during analysis) or the only measured concentrations are "J" coded values less than the detection limits.

The use of statistical methods to calculate exposure point concentrations can result in calculated concentrations that exceed the maximum measured concentrations, particularly when the sample size is small and the standard deviation of the results is large. Use of a statistical approach to calculate exposure point concentrations when the sample size is small or standard deviation is large is likely to result in an over-estimation of risk.

7.2.2 Exposure Scenarios

The exposure assessment relied on a number of assumptions for potential human exposure. Assumptions used were based on:

- Site-specific information (including information provided in the Baseline Risk Assessment [B&V, 1993])
- RAGS (USEPA, 1989a), the Exposure Factors Handbook (USEPA, 1989b), and Dermal Exposure Assessment: Principles and Applications (USEPA, 1992a)
- Professional judgment

The average case scenarios represent assumptions which are considered central values, or realistically conservative estimates for the exposed population. However, even the average case exposure scenario is conservative because it assumes individuals are exposed on a regular basis over a long period of time, and thus are likely to over-estimate risk. RME scenarios are developed to provide an upper bound risk estimate. The RME scenarios are based upon a combination of conservative assumptions for all variables related to exposure, and thus are highly likely to over-estimate potential risks.

In some cases (e.g., the dermal permeability constants), published information for one chemical has been assumed to be representative of other related chemicals. These assumptions may lead to over- or under-estimation of risk. The general approach used in this assessment was to use conservative assumptions for intake variables in the absence of strong scientific data, thus minimizing the likelihood that risks are under-estimated.

7.3 TOXICITY ASSESSMENT

7.3.1 Uncertainties Associated with Critical Toxicity Values

In general, the available scientific information is insufficient to provide a thorough understanding of all the potential toxic properties of chemicals to which humans are potentially exposed. Consequently, varying degrees of uncertainty surround the assessment

of adverse health effects among exposed populations. Sources of uncertainty related directly to toxicity data include:

- Use of dose-response data from experiments on homogenous, sensitive animal populations to predict effects in heterogeneous human populations with a wide range of sensitivities.
- Extrapolation of data from: 1) high dose animal studies to low dose human exposures; 2) acute or subchronic exposure; and 3) one exposure route to another (e.g., from ingestion to inhalation or dermal absorption).
- Use of single-chemical test data that does not account for multiple exposures or synergistic and antagonistic responses.
- Critical toxicity values (RfDs or Slope Factors) are predicted values for the most sensitive subpopulations.

Because there are numerous potential sources of uncertainty associated with the basic toxicology data, a high degree of overall uncertainty may be associated with the Critical Toxicity Values used in the risk assessment. In an attempt to minimize the consequences of uncertainty, USEPA guidance typically relies on a conservative approach, applying numerous safety factors to the toxicity data to insure the Critical Toxicity Values used in the risk assessment are protective of all sensitive human populations. Use of these critical toxicity values is highly likely to over-estimate potential risk.

7.4 RISK CHARACTERIZATION

Because there are uncertainties in each step of the risk assessment process, these uncertainties are often magnified in the final risk characterization. The final quantitative estimates of risk may be one or several orders of magnitude different from the potential risk associated with the given exposure. Because of the conservative approaches used in each step, the overall results of the risk assessment are more likely to over-estimate than to under-estimate the potential risk associated with contaminants in Soldier Creek.

7.5 REMEDIAL ACTION OBJECTIVES

Remedial action objectives are developed for the COCs using exposure assumptions developed in the exposure assessment and critical toxicity values identified in the toxicity assessment. All of the uncertainties associated with selection of COCs, development of exposure assumptions, and use of EPA-derived toxicity values also apply to the calculation of remedial action objectives. Because of the inherent conservatism designed into the risk assessment process, the resulting remedial action objectives are likely to be overly conservative.

TABLE 7-1

SUMMARY OF UNCERTAINTIES ASSOCIATED WITH RISK ASSESSMENT FOR SOLDIER CREEK

Assumptions	Estimated Magnitude of Effect on Risk	Direction of Effect on Risk Estimate
Data Collection and Evaluation		
Samples collected were representative of conditions to which various populations may be exposed.	Low - Moderate	May over- or underestimate risk.
Errors in chemical analysis	Low	May over- or underestimate risk.
High detection limit	Low-Moderate	May over- or underestimate risk.
For RME exposure scenarios, the 95th percentile UCL concentrations were used to estimate risk.	Low - Moderate	Likely result in an overestimate of risk.
Inclusion of background level organic compounds in the risk calculation.	Low - Moderate	May overestimate site-related risks.
Exposure Assessment		
Use of existing chemical concentrations projected into the future	Low - Moderate	May overestimate site-related risks.
Chemical concentrations reported as "below method detection limit" are used at one-half detection limit when calculating mean chemical concentration	Low - Moderate	May over- or underestimate risk, but usually overestimate risk.
Use combination of conservative assumptions to estimate RME associated risks.	Moderate	May over- or underestimate risk.
Toxicity Assessment		
The use of conservative USEPA models for developing Slope Factors (SF)	Moderate - High	May overestimate risk
The Reference doses (RfD) for a compound is an estimate of the threshold concentration for the most sensitive human population associated with the lowest observed adverse effect for that compound	Moderate - High	May overestimate risk
Hazard indices (HIs) were developed assuming all toxic effects were additive	Low - Moderate	May overestimate risk
Risk Characterization		
Conservative approaches used in each step	Moderate - High	May overestimate risk
Remedial Action Objectives		
All the uncertainties associated with COC selection, exposure assumption development, and EPA-derived toxicity values are used.	Moderate - High	Likely to be overly conservative.

8.0
SUMMARY AND CONCLUSION

This risk assessment has evaluated potential health hazards (i.e., non-carcinogenic effects) and cancer risks associated with exposure to surface water and sediment from portions of East and West Soldier Creek that may have been impacted by contaminant releases from Tinker Air Force Base (AFB). Based on difference in contaminant sources and exposed populations, the following four different stream segments were evaluated qualitatively in this risk assessment:

- West Soldier Creek, on-base
- West Soldier Creek, off-base
- East Soldier Creek, on-base
- East Soldier Creek, off-base

Chemicals of concern were identified based on the evaluation of chemical data from surface water and sediment samples collected by Woodward-Clyde in the first four quarterly sampling events (WCFS, 1994), supplemented with chemical data from sediment samples collected by Parson Engineering Science (1995). An evaluation of potential health risks has been performed for a group of exposure scenarios believed to represent potential forms of human activities that could occur at these areas. These exposure scenarios include the following:

- Construction workers involved in repair or installation of underground pipelines around or under on-base portion of the creeks; and
- Residents wading or swimming in the off-base portion of West and East Soldier Creeks. (Swimming was only evaluated for the child scenario for East Soldier Creek, while all other scenarios assume wading only).

Potential health risks associated with surface water and sediment exposure were evaluated for both on-site construction workers and off-site residents. The results of the risk characterization indicate that potential cancer risks and non-carcinogenic health hazards for all scenarios are less than the advisory range of 10^{-6} to 10^{-4} and 1.0, respectively. These

results indicate that exposure to surface water and sediments in West and East Soldier Creeks is not likely to result in an unacceptable cancer risk or non-carcinogenic hazard for any on-base or off-base populations under current or future stream use conditions.

The results of this current risk assessment were compared to those presented in the previous baseline risk assessment prepared by B&V (1993). The following differences in approaches/assumptions were noted between these two documents:

- The current RA evaluated PCBs/chlorinated pesticides as potential COCs. The RA prepared by B&V did not include these data;
- The individual stream segment, evaluated in the B&V RA are not identical to the segments evaluated in the current RA (the stream segments evaluated in the current RA are thought to be mare representative of actual stream use); and
- Some of the exposure assumptions used in current RA are different than those used in B&V RA (e.g., the current RA uses age-corrected surface area for evaluating exposure to surface water and sediments; B&V RA values were not age corrected).

Despite these slight difference in approach, both RAs concluded that there are no unacceptable cancer risks or non-carcinogenic hazard associated with exposure to West or East Soldier Creeks for any on-base or off-base populations, under current or future stream use conditions. Thus no remedial action appears to be warranted base on risks to human health.

As part of the risk assessment, a set of cleanup goals was developed to identify health-protective levels for each COCs. Although remediation does not appear to be warranted at the present time (based on risk to human health), these cleanup goals provide a set of "action criteria", should remedial action be required in the future.

9.0
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TABLE A-1

TINKER AFB SITE - ON-BASE WEST SOLDIER CREEK (AREA 1)
INGESTION EXPOSURE TO CHEMICALS IN SURFACE WATER
ON-BASE CONSTRUCTION WORKER -AVERAGE EXPOSURE
(CURRENT AND FUTURE USE SCENARIO)

Equation : CDI = (CW X IR X ET X EF X ED)/ (BW X AT1 X AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
CDI = Chronic Daily Intake
CW = Concentration in Surface Water
IR = Ingestion Rate = 0.0025 L/hour
ET = Exposure Time = 4 hours per day
EF = Exposure Frequency = 1 day per year
ED = Exposure Duration = 5 years
BW = Body Weight = 70 kg
AT1 = Days Per Year = 365 days
AT2 = Averaging Time (70 years for cancer causing effects, 5 years for effects other than carcinogenicity)
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CW (mg/L)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)-1	CANCER RISK (unitless)
Metals							
Arsenic	2.54E-03	9.95E-10	3.00E-04	3.32E-06	7.11E-11	1.50E+00	1.07E-10
Cobalt	9.00E-03	3.52E-09	6.00E-02	5.87E-08	2.52E-10		
Nickel	6.89E-02	2.69E-08	2.00E-02	1.35E-06	1.92E-09		
Vanadium	6.46E-03	2.53E-09	7.00E-03	3.61E-07	1.81E-10		
Semivolatile Organics							
3/4-Methylphenol	1.70E-03	6.65E-10	5.00E-02	1.33E-08	4.75E-11		
N-Nitroso-di-n-propylamine	1.80E-03	7.05E-10			5.03E-11	7.00E+00	3.52E-10
Phenol	1.40E-03	5.48E-10	6.00E-01	9.13E-10	3.91E-11		
Volatile Organics							
Acetone	5.19E-03	2.03E-09	1.00E-01	2.03E-08	1.45E-10		
Chlorobenzene	1.80E-03	7.05E-10	2.00E-02	3.52E-08	5.03E-11		
Methylene chloride	2.09E-03	8.16E-10	6.00E-02	1.36E-08	5.83E-11	7.50E-03	4.37E-13
Tetrachloroethene	4.36E-03	1.71E-09	1.00E-02	1.71E-07	1.22E-10		
Toluene	1.70E-03	6.65E-10	2.00E-01	3.33E-09	4.75E-11		
Trichloroethene	3.94E-03	1.54E-09	6.00E-03	2.57E-07	1.10E-10	1.10E-02	1.21E-12
Vinyl chloride	1.00E-03	3.91E-10			2.80E-11	1.90E+00	5.31E-11
			HAZARD INDEX =	5.60E-06		TOTAL CANCER RISK =	5.14E-10

TABLE A-2

TINKER AFB SITE - ON-BASE WEST SOLDIER CREEK (AREA 1)
INGESTION EXPOSURE TO CHEMICALS IN SURFACE WATER
ON-BASE CONSTRUCTION WORKER - RME
(CURRENT AND FUTURE USE SCENARIO)

Equation : CDI = (CW X IR X ET X EF X ED)/ (BW X AT1 X AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
CDI = Chronic Daily Intake
CW = Concentration in Surface Water
IR = Ingestion Rate = 0.005 L/hour
ET = Exposure Time = 8 hours/day
EF = Exposure Frequency = 5 days per year
ED = Exposure Duration = 25 years
BW = Body Weight = 70 kg
AT1 = Days Per Year = 365 days
AT2 = Averaging Time (70 years for cancer causing effects, 25 years for effects other than carcinogenicity)
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CW (mg/L)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)-1	CANCER RISK (unitless)
Metals							
Arsenic	3.50E-03	2.74E-08	3.00E-04	9.13E-05	9.78E-09	1.50E+00	1.47E-08
Cobalt	2.06E-02	1.61E-07	6.00E-02	2.69E-06	5.76E-08		
Nickel	3.08E-01	2.41E-06	2.00E-02	1.21E-04	8.61E-07		
Vanadium	9.06E-03	7.09E-08	7.00E-03	1.01E-05	2.53E-08		
Semivolatile Organics							
3/4-Methylphenol	1.70E-03	1.33E-08	5.00E-02	2.66E-07	4.75E-09		
N-Nitroso-di-n-propylamine	1.80E-03	1.41E-08			5.03E-09	7.00E+00	3.52E-08
Phenol	1.40E-03	1.10E-08	6.00E-01	1.83E-08	3.91E-09		
Volatile Organics							
Acetone	5.72E-03	4.48E-08	1.00E-01	4.48E-07	1.60E-08		
Chlorobenzene	1.80E-03	1.41E-08	2.00E-02	7.05E-07	5.03E-09		
Methylene chloride	2.60E-03	2.04E-08	6.00E-02	3.39E-07	7.27E-09	7.50E-03	5.45E-11
Tetrachloroethene	9.79E-03	7.66E-08	1.00E-02	7.66E-06	2.74E-08		
Toluene	1.70E-03	1.33E-08	2.00E-01	6.65E-08	4.75E-09		
Trichloroethene	1.00E-02	7.86E-08	6.00E-03	1.31E-05	2.81E-08	1.10E-02	3.09E-10
Vinyl chloride	1.00E-03	7.83E-09			2.80E-09	1.90E+00	5.31E-09
			HAZARD INDEX =	2.47E-04		TOTAL CANCER RISK =	5.56E-08

TABLE A-3

TINKER AFB SITE - ON-BASE EAST SOLDIER CREEK (AREA 3)
INGESTION EXPOSURE TO CHEMICALS IN SURFACE WATER
ON-BASE CONSTRUCTION WORKER -AVERAGE EXPOSURE
(CURRENT AND FUTURE USE SCENARIO)

Equation : **CDI = (CW X IR X ET X EF X ED)/ (BW X AT1 X AT2)**
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
CDI = Chronic Daily Intake
CW = Concentration in Surface Water
IR = Ingestion Rate = 0.0025 L/hour
ET = Exposure Time = 4 hours per day
EF = Exposure Frequency = 1 day per year
ED = Exposure Duration = 5 years
BW = Body Weight = 70 kg
AT1 = Days Per Year = 365 days
AT2 = Averaging Time (70 years for cancer causing effects, 5 years for effects other than carcinogenicity)
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CW (mg/L)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)-1	CANCER RISK (unitless)
Metals							
Arsenic	2.21E-03	8.63E-10	0.0003	2.88E-06	6.17E-11	1.5	9.25E-11
Molybdenum	1.26E-01	4.94E-08	0.005	9.88E-06	3.53E-09		
Nickel	2.06E-02	8.08E-09	0.02	4.04E-07	5.77E-10		
Vanadium	1.50E-02	5.86E-09	0.007	8.38E-07	4.19E-10		
Chlorinated Pesticides							
Aldrin	5.13E-05	2.01E-11	0.00003	6.69E-07	1.43E-12	17	2.44E-11
Semivolatile Organics							
4-Nitrophenol	2.00E-03	7.83E-10	0.008	9.78E-08	5.59E-11		
Benzoic acid	3.90E-03	1.53E-09	4	3.82E-10	1.09E-10		
Benzyl alcohol	1.70E-03	6.65E-10	0.3	2.22E-09	4.75E-11		
bis(2-Ethylhexyl)phthalate	4.60E-03	1.80E-09	0.02	9.00E-08	1.29E-10	0.014	1.80E-12
Fluoranthene	1.50E-03	5.87E-10	0.04	1.47E-08	4.19E-11		
Phenol	3.50E-03	1.37E-09	0.6	2.28E-09	9.78E-11		
Volatile Organics							
2-Butanone (MEK)	2.80E-03	1.10E-09	0.6	1.83E-09	7.83E-11		
Acetone	6.26E-03	2.45E-09	0.1	2.45E-08	1.75E-10		
Bromoform	2.33E-03	9.12E-10	0.02	4.56E-08	6.52E-11	0.0079	5.15E-13
Chloroform	1.80E-03	7.05E-10	0.01	7.05E-08	5.03E-11	0.0061	3.07E-13
Methylene chloride	5.55E-03	2.17E-09	0.06	3.62E-08	1.55E-10	0.0075	1.16E-12
Toluene	1.40E-03	5.48E-10	0.2	2.74E-09	3.91E-11		
			HAZARD INDEX =	1.51E-05	TOTAL CANCER RISK =		1.21E-10

TABLE A-4

TINKER AFB SITE - ON-BASE EAST SOLDIER CREEK (AREA 3)
INGESTION EXPOSURE TO CHEMICALS IN SURFACE WATER
ON-BASE CONSTRUCTION WORKER -RME
(CURRENT AND FUTURE USE SCENARIO)

Equation : CDI = (CW X IR X ET X EF X ED)/ (BW X AT1 X AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
CDI = Chronic Daily Intake
CW = Concentration in Surface Water
IR = Ingestion Rate = 0.005 L/hour
ET = Exposure Time = 8 hours/day
EF = Exposure Frequency = 5 days per year
ED = Exposure Duration = 25 years
BW = Body Weight = 70 kg
AT1 = Days Per Year = 365 days
AT2 = Averaging Time (70 years for cancer causing effects, 25 years for effects other than carcinogenicity)
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CW (mg/L)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)-1	CANCER RISK (unitless)
Metals							
Arsenic	2.45E-03	1.92E-08	0.0003	6.40E-05	6.85E-09	1.5	1.03E-08
Molybdenum	2.64E-01	2.06E-06	0.005	4.13E-04	7.37E-07		
Nickel	2.24E-02	1.75E-07	0.02	8.76E-06	6.25E-08		
Vanadium	1.76E-02	1.38E-07	0.007	1.97E-05	4.93E-08		
Chlorinated Pesticides							
Aldrin	1.00E-04	7.83E-10	0.00003	2.61E-05	2.80E-10	17	4.75E-09
Semivolatile Organics							
4-Nitrophenol	2.00E-03	1.57E-08	0.008	1.96E-06	5.59E-09		
Benzoic acid	3.90E-03	3.05E-08	4	7.63E-09	1.09E-08		
Benzyl alcohol	1.70E-03	1.33E-08	0.3	4.44E-08	4.75E-09		
bis(2-Ethylhexyl)phthalate	4.60E-03	3.60E-08	0.02	1.80E-06	1.29E-08	0.014	1.80E-10
Fluoranthene	1.50E-03	1.17E-08	0.04	2.94E-07	4.19E-09		
Phenol	3.50E-03	2.74E-08	0.6	4.57E-08	9.78E-09		
Volatile Organics							
2-Butanone (MEK)	2.80E-03	2.19E-08	0.6	3.65E-08	7.83E-09		
Acetone	6.79E-03	5.32E-08	0.1	5.32E-07	1.90E-08		
Bromoform	2.46E-03	1.93E-08	0.02	9.64E-07	6.88E-09	0.0079	5.44E-11
Chloroform	1.80E-03	1.41E-08	0.01	1.41E-06	5.03E-09	0.0061	3.07E-11
Methylene chloride	5.55E-03	4.35E-08	0.06	7.25E-07	1.55E-08	0.0075	1.16E-10
Toluene	1.40E-03	1.10E-08	0.2	5.48E-08	3.91E-09		
			HAZARD INDEX =	5.39E-04	TOTAL CANCER RISK =		1.54E-08

TABLE A-5

TINKER AFB SITE - ON-BASE WEST SOLDIER CREEK (AREA 1)
DERMAL EXPOSURE TO CHEMICALS IN SURFACE WATER
ON-BASE CONSTRUCTION WORKER -AVERAGE EXPOSURE
(CURRENT AND FUTURE USE SCENARIOS)

Equation : CDI = (CW x SA x PC x ET x EF x ED x CF)/(BW x AT1 x AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where: CDI = Chronic Daily Intake
CW = Concentration in Surface Water
SA = Skin Surface Area Available for Contact = 2,000 cm^2
PC = Chemical-specific Dermal Permeability Constant
ET = Exposure Time = 4 hours per day
EF = Exposure Frequency = 1 day per year
ED = Exposure Duration = 5 years
CF = Volumetric Conversion Factor for Water = 0.001 L/cm^3
BW = Body Weight = 70 kg
AT1 = Days Per Year = 365 days
AT2 = Averaging Time (70 years for cancer causing effects, 5 years for effects other than carcinogenicity)
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CW (mg/L)	PC[a] (cm/hr)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)-1	CANCER RISK (unitless)
Metals								
Arsenic	2.54E-03	0.001	7.96E-10	0.0003	2.65E-06	5.69E-11	1.5	8.53E-11
Cobalt	9.00E-03	0.001	2.82E-09	0.06	4.70E-08	2.01E-10		
Nickel	6.89E-02	0.001	2.16E-08	0.02	1.08E-06	1.54E-09		
Vanadium	6.46E-03	0.001	2.02E-09	0.007	2.89E-07	1.44E-10		
Semivolatile Organics								
3/4-Methylphenol	1.70E-03	0.018	9.58E-09	0.05	1.92E-07	6.84E-10		
N-Nitroso-di-n-propylamine	1.80E-03	0.0048	2.71E-09			1.93E-10	7	1.35E-09
Phenol	1.40E-03	0.0082	3.59E-09	0.6	5.99E-09	2.57E-10		
Volatile Organics								
Acetone	5.19E-03			0.1				
Chlorobenzene	1.80E-03			0.02				
Methylene chloride	2.09E-03			0.06			0.0075	
Tetrachloroethene	4.36E-03			0.01				
Toluene	1.70E-03			0.2				
Trichloroethene	3.94E-03			0.006			0.011	
Vinyl chloride	1.00E-03						1.9	
				HAZARD INDEX =	4.27E-06		TOTAL CANCER RISK =	1.44E-09

Note:
a. Due to the volatility, volatile organics are assumed not available for dermal absorption.

TABLE A-6

TINKER AFB SITE - ON-BASE WEST SOLDIER CREEK (AREA 1)
DERMAL EXPOSURE TO CHEMICALS IN SURFACE WATER
ON-BASE CONSTRUCTION WORKER -RME
(CURRENT AND FUTURE USE SCENARIOS)

Equation : CDI = (CW x SA x PC x ET x EF x ED x CF)/(BW x AT1 x AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where: CDI = Chronic Daily Intake
CW = Concentration in Surface Water
SA = Skin Surface Area Available for Contact = 9,800 cm^2
PC = Chemical-specific Dermal Permeability Constant
ET = Exposure Time = 8 hours per day
EF = Exposure Frequency = 5 days per year
ED = Exposure Duration = 25 years
CF = Volumetric Conversion Factor for Water = 0.001 L/cm^3
BW = Body Weight = 70 kg
AT1 = Days Per Year = 365 days
AT2 = Averaging Time (70 years for cancer causing effects, 25 years for effects other than carcinogenicity)
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CW (mg/L)	PC[a] (cm/hr)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)-1	CANCER RISK (unitless)
Metals								
Arsenic	3.50E-03	0.001	5.37E-08	0.0003	1.79E-04	1.92E-08	1.5	2.88E-08
Cobalt	2.06E-02	0.001	3.16E-07	0.06	5.27E-06	1.13E-07		
Nickel	3.08E-01	0.001	4.73E-06	0.02	2.36E-04	1.69E-06		
Vanadium	9.06E-03	0.001	1.39E-07	0.007	1.99E-05	4.96E-08		
Semivolatile Organics								
3/4-Methylphenol	1.70E-03	0.018	4.69E-07	0.05	9.39E-06	1.68E-07		
N-Nitroso-di-n-propylamine	1.80E-03	0.0048	1.33E-07			4.73E-08	7	3.31E-07
Phenol	1.40E-03	0.0082	1.76E-07	0.6	2.94E-07	6.29E-08		
Volatile Organics								
Acetone	5.72E-03			0.1				
Chlorobenzene	1.80E-03			0.02				
Methylene chloride	2.60E-03			0.06			0.0075	
Tetrachloroethene	9.79E-03			0.01				
Toluene	1.70E-03			0.2				
Trichloroethene	1.00E-02			0.006			0.011	
Vinyl chloride	1.00E-03						1.9	
				HAZARD INDEX =	4.50E-04		TOTAL CANCER RISK =	3.60E-07

Note:
a. Due to the volatility, volatile organics are assumed not available for dermal absorption.

TABLE A-7

TINKER AFB SITE - ON-BASE EAST SOLDIER CREEK (AREA 3)
DERMAL EXPOSURE TO CHEMICALS IN SURFACE WATER
ON-BASE CONSTRUCTION WORKER -AVERAGE EXPOSURE
(CURRENT AND FUTURE USE SCENARIOS)

Equation : CDI = (CW x SA x PC x ET x EF x ED x CF)/(BW x AT1 x AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where: CDI = Chronic Daily Intake
CW = Concentration in Surface Water
SA = Skin Surface Area Available for Contact = 2,000 cm^2
PC = Chemical-specific Dermal Permeability Constant
ET = Exposure Time = 4 hours per day
EF = Exposure Frequency = 1 day per year
ED = Exposure Duration = 5 years
CF = Volumetric Conversion Factor for Water = 0.001 L/cm^3
BW = Body Weight = 70 kg
AT1 = Days Per Year = 365 days
AT2 = Averaging Time (70 years for cancer causing effects, 5 years for effects other than carcinogenicity)
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CW (mg/L)	PC[a] (cm/hr)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)-1	CANCER RISK (unitless)
Metals								
Arsenic	2.21E-03	0.001	6.91E-10	0.0003	2.30E-06	4.93E-11	1.5	7.40E-11
Molybdenum	1.26E-01	0.001	3.95E-08	0.005	7.91E-06	2.82E-09		
Nickel	2.06E-02	0.001	6.46E-09	0.02	3.23E-07	4.62E-10		
Vanadium	1.50E-02	0.001	4.69E-09	0.007	6.70E-07	3.35E-10		
Chlorinated Pesticides								
Aldrin	5.13E-05	0.0016	2.57E-11	0.00003	8.56E-07	1.83E-12	17	3.12E-11
Semivolatile Organics								
4-Nitrophenol	2.00E-03	0.0056	3.51E-09	0.008	4.38E-07	2.50E-10		
Benzoic acid	3.90E-03	0.0073	8.91E-09	4	2.23E-09	6.37E-10		
Benzyl alcohol	1.70E-03			0.3				
bis(2-Ethylhexyl)phthalate	4.60E-03	0.033	4.75E-08	0.02	2.38E-06	3.40E-09	0.014	4.75E-11
Fluoranthene	1.50E-03	0.36	1.69E-07	0.04	4.23E-06	1.21E-08		
Phenol	3.50E-03	0.0082	8.99E-09	0.6	1.50E-08	6.42E-10		
Volatile Organics								
2-Butanone (MEK)	2.80E-03			0.6				
Acetone	6.26E-03			0.1				
Bromoform	2.33E-03			0.02			0.0079	
Chloroform	1.80E-03			0.01			0.0061	
Methylene chloride	5.55E-03			0.06			0.0075	
Toluene	1.40E-03			0.2				
				HAZARD INDEX =	1.91E-05	TOTAL CANCER RISK =		1.53E-10

Note:
a. Due to the volatility, volatile organics are assumed not available for dermal absorption.

TABLE A-8

TINKER AFB SITE - ON-BASE EAST SOLDIER CREEK (AREA 3)
DERMAL EXPOSURE TO CHEMICALS IN SURFACE WATER
ON-BASE CONSTRUCTION WORKER -RME
(CURRENT AND FUTURE USE SCENARIOS)

Equation : CDI = (CW x SA x PC x ET x EF x ED x CF)/(BW x AT1 x AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where: CDI = Chronic Daily Intake
CW = Concentration in Surface Water
SA = Skin Surface Area Available for Contact =9,800 cm^2
PC = Chemical-specific Dermal Permeability Constant
ET = Exposure Time = 8 hours per day
EF = Exposure Frequency = 5 days per year
ED = Exposure Duration = 25 years
CF = Volumetric Conversion Factor for Water = 0.001 L/cm^3
BW = Body Weight = 70 kg
AT1 = Days Per Year = 365 days
AT2 = Averaging Time (70 years for cancer causing effects, 25 years for effects other than carcinogenicity)
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CW (mg/L)	PC[a] (cm/hr)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)-1	CANCER RISK (unitless)
Metals								
Arsenic	2.45E-03	0.001	3.76E-08	0.0003	1.25E-04	1.34E-08	1.5	2.01E-08
Molybdenum	2.64E-01	0.001	4.05E-06	0.005	8.09E-04	1.45E-06		
Nickel	2.24E-02	0.001	3.43E-07	0.02	1.72E-05	1.23E-07		
Vanadium	1.76E-02	0.001	2.70E-07	0.007	3.86E-05	9.66E-08		
Chlorinated Pesticides								
Aldrin	1.00E-04	0.018	2.76E-08	0.00003	9.21E-04	9.86E-09	17	1.68E-07
Semivolatile Organics		0.0048						
4-Nitrophenol	2.00E-03	0.0082	2.52E-07	0.008	3.15E-05	8.99E-08		
Benzoic acid	3.90E-03			4				
Benzyl alcohol	1.70E-03			0.3				
bis(2-Ethylhexyl)phthalate	4.60E-03			0.02			0.014	
Fluoranthene	1.50E-03			0.04				
Phenol	3.50E-03			0.6				
Volatile Organics								
2-Butanone (MEK)	2.80E-03			0.6				
Acetone	6.79E-03			0.1				
Bromoform	2.46E-03			0.02			0.0079	
Chloroform	1.80E-03			0.01			0.0061	
Methylene chloride	5.55E-03			0.06			0.0075	
Toluene	1.40E-03			0.2				
				HAZARD INDEX =	1.94E-03	TOTAL CANCER RISK =		1.88E-07

Note:
a. Due to the volatility, volatile organics are assumed not available for dermal absorption.

TABLE A-9

TINKER AFB SITE - ON-BASE WEST SOLDIER CREEK (AREA 1)
DERMAL EXPOSURE TO CHEMICALS IN SEDIMENTS
ON-BASE CONSTRUCTION WORKER -AVERAGE EXPOSURE
(FUTURE USE SCENARIO)

Equation CDI = (CS x CF x SA x AF x ABS x EF x ED)/(BW x AT1 x AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
CDI = Chronic Daily Intake
CS = Concentration in Sediments
CF = Conversion Factor (10^{-6} kg/mg)
SA = Skin Surface Area Available for Contact = 2,000 cm^2
AF = Dermal Soil Adherence Factor = 0.2 mg/cm^2
ABS = Absorption Factor = 1.0% for organics and 0.1% for inorganics
EF = Exposure Frequency = 1 day per year
ED = Exposure Duration = 5 years
BW = Body Weight = 70 kg
AT1 = Days Per Year = 365 dyas
AT2 = Averaging Time (70 years for cancer causing effects, 5 yearsfor effects other than carcinogenic
SF = Slope Factor
RfD = Reference Dose

CONTAMINANTS OF CONCERN	CS (mg/kg)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)-1	CANCER RISK (unitless)
Metals							
Antimony	4.39E+00	6.87E-11	0.0004	1.72E-07	4.91E-12		
Beryllium	8.76E-01	1.37E-11	0.005	2.74E-09	9.80E-13	4.3	4.21E-12
Cadmium	1.98E+01	3.11E-10	0.001	3.11E-07	2.22E-11		
Chromium	4.14E+02	6.48E-09	1	6.48E-09	4.63E-10		
Cobalt	2.42E+01	3.79E-10	0.06	6.32E-09	2.71E-11		
Lead	9.71E+01	1.52E-09			1.09E-10		
Mercury	1.22E-01	1.91E-12	0.0003	6.36E-09	1.36E-13		
Nickel	3.79E+02	5.93E-09	0.02	2.96E-07	4.23E-10		
Silver	1.86E+01	2.92E-10	0.005	5.83E-08	2.08E-11		
Thallium	2.00E-01	3.13E-12	0.00008	3.91E-08	2.24E-13		
Vanadium	3.33E+01	5.22E-10	0.007	7.46E-08	3.73E-11		
PCBs/Pesticides							
Aldrin	1.10E-02	1.72E-12	0.00003	5.74E-08	1.23E-13	17	2.09E-12
Aroclor 1254	2.96E+00	4.64E-10	0.00002	2.32E-05	3.31E-11		
Semivolatile organics							
1,2-Dichlorobenzene	4.62E-01	7.23E-11	0.09	8.03E-10	5.16E-12		
1,4-Dichlorobenzene	2.10E-01	3.29E-11			2.35E-12	0.024	5.64E-14
2,4-Dimethylphenol	3.50E-01	5.48E-11	0.02	2.74E-09	3.91E-12		
2-Methylnaphthalene	1.50E-01	2.35E-11	0.03	7.83E-10	1.68E-12		
3/4-Methylphenol	2.20E-01	3.44E-11	0.05	6.89E-10	2.46E-12		
Acenaphthene	4.28E-01	6.71E-11	0.06	1.12E-09	4.79E-12		
Anthracene	4.50E-01	7.05E-11	0.3	2.35E-10	5.04E-12		
Benzidine	4.30E-01	6.73E-11	0.003	2.24E-08	4.81E-12	230	1.11E-09
Benzo(a)anthracene	8.47E-01	1.33E-10			9.47E-12	0.73	6.92E-12
Benzo(a)pyrene	9.05E-01	1.42E-10			1.01E-11	7.3	7.39E-11
Benzo(b)fluoranthene	1.44E+00	2.26E-10			1.61E-11	0.73	1.18E-11
Benzo(g,h,i)perylene	5.63E-01	8.81E-11	0.03	2.94E-09	6.29E-12		
Benzo(k)fluoranthene	6.51E-01	1.02E-10			7.28E-12	0.073	5.31E-13
bis(2-Ethylhexyl)phthalate	1.35E+00	2.12E-10			1.51E-11	0.014	2.12E-13
Butyl benzyl phthalate	3.70E-01	5.79E-11	0.2	2.90E-10	4.14E-12		
Chrysene	9.96E-01	1.56E-10			1.11E-11	0.0073	8.13E-14
Di-n-butyl phthalate	1.50E-01	2.35E-11	0.1	2.35E-10	1.68E-12		
Dibenz(a,h)anthracene	4.88E-01	7.64E-11			5.46E-12	7.3	3.99E-11
Dibenzofuran	3.60E-01	5.64E-11	0.004	1.41E-08	4.03E-12		
Dimethyl phthalate	7.50E-02	1.17E-11	10	1.17E-12	8.39E-13		
Fluoranthene	1.66E+00	2.59E-10	0.04	6.48E-09	1.85E-11		
Fluorene	4.25E-01	6.66E-11	0.04	1.66E-09	4.76E-12		
Indeno(1,2,3-cd)pyrene	5.97E-01	9.34E-11			6.67E-12	0.73	4.87E-12
Naphthalene	4.50E-01	7.04E-11	0.03	2.35E-09	5.03E-12		
Phenanthrene	1.21E+00	1.89E-10	0.03	6.30E-09	1.35E-11		
Pyrene	1.41E+00	2.20E-10	0.03	7.34E-09	1.57E-11		
Volatile Oragnics							
2-Butanone (MEK)	1.00E-02	1.57E-12	0.6	2.61E-12	1.12E-13		
Acetone	2.41E-02	3.77E-12	0.1	3.77E-11	2.69E-13		
Carbon disulfide	4.42E-03	6.92E-13	0.1	6.92E-12	4.94E-14		
Chlorobenzene	7.80E-03	1.22E-12	0.02	6.10E-11	8.72E-14		
Chloromethane	3.30E-03	5.17E-13			3.69E-14	0.013	4.80E-16
Methylene chloride	4.45E-03	6.97E-13	0.06	1.16E-11	4.98E-14	0.0075	3.74E-16
Tetrachloroethene	4.96E-03	7.76E-13	0.01	7.76E-11	5.54E-14		
Toluene	4.24E-03	6.65E-13	0.2	3.32E-12	4.75E-14		
Trichloroethene	6.75E-03	1.06E-12	0.006	1.76E-10	7.54E-14	0.011	8.30E-16
Vinyl chloride	5.66E-03	8.86E-13			6.33E-14	1.9	1.20E-13
			HAZARD INDEX =	2.43E-05		TOTAL CANCER RISK =	1.25E-09

TABLE A-10

TINKER AFB SITE - ON-BASE WEST SOLDIER CREEK (AREA 1)
DERMAL EXPOSURE TO CHEMICALS IN SEDIMENTS
ON-BASE CONSTRUCTION WORKER -RME
(FUTURE USE SCENARIO)

Equation CDI = (CS x CF x SA x AF x ABS x EF x ED)/(BW x AT1 x AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
CDI = Chronic Daily Intake
CS = Concentration in Sediments
CF = Conversion Factor (10^{-6} kg/mg)
SA = Skin Surface Area Available for Contact = 9,800 cm^2
AF = Dermal Soil Adherence Factor = 1.0 mg/cm^2
ABS = Absorption Factor = 1.0% for organics and 0.1% for inorganics
EF = Exposure Frequency = 5 days per year
ED = Exposure Duration = 25 years
BW = Body Weight = 70 kg
AT1 = Days Per Year = 365 dyas
AT2 = Averaging Time (70 years for cancer causing effects, 25 yearsfor effects other than carcinogeni
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CS (mg/kg)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)-1	CANCER RISK (unitless)
Metals							
Antimony	4.70E+00	9.01E-09	0.0004	2.25E-05	3.22E-09		
Beryllium	1.00E+00	1.93E-09	0.005	3.85E-07	6.88E-10	4.3	2.96E-09
Cadmium	6.88E+01	1.32E-07	0.001	1.32E-04	4.71E-08		
Chromium	7.64E+02	1.47E-06	1	1.47E-06	5.23E-07		
Cobalt	3.10E+01	5.94E-08	0.06	9.89E-07	2.12E-08		
Lead	1.62E+02	3.10E-07			1.11E-07		
Mercury	1.39E-01	2.67E-10	0.0003	8.91E-07	9.55E-11		
Nickel	7.55E+02	1.45E-06	0.02	7.24E-05	5.17E-07		
Silver	5.12E+01	9.82E-08	0.005	1.96E-05	3.51E-08		
Thallium	2.00E-01	3.84E-10	0.00008	4.79E-06	1.37E-10		
Vanadium	3.73E+01	7.16E-08	0.007	1.02E-05	2.56E-08		
PCBs/Pesticides							
Aldrin	1.10E-02	2.11E-10	0.00003	7.03E-06	7.53E-11	17	1.28E-09
Aroclor 1254	2.71E+01	5.20E-07	0.00002	2.60E-02	1.86E-07		
Semivolatile organics							
1,2-Dichlorobenzene	5.07E-01	9.73E-09	0.09	1.08E-07	3.47E-09		
1,4-Dichlorobenzene	2.10E-01	4.03E-09			1.44E-09	0.024	3.45E-11
2,4-Dimethylphenol	3.50E-01	6.71E-09	0.02	3.36E-07	2.40E-09		
2-Methylnaphthalene	1.50E-01	2.88E-09	0.03	9.59E-08	1.03E-09		
3/4-Methylphenol	2.20E-01	4.22E-09	0.05	8.44E-08	1.51E-09		
Acenaphthene	4.60E-01	8.82E-09	0.06	1.47E-07	3.15E-09		
Anthracene	5.49E-01	1.05E-08	0.3	3.51E-08	3.76E-09		
Benzidine	4.30E-01	8.25E-09	0.003	2.75E-06	2.95E-09	230	6.77E-07
Benzo(a)anthracene	1.63E+00	3.13E-08			1.12E-08	0.73	8.16E-09
Benzo(a)pyrene	1.66E+00	3.19E-08			1.14E-08	7.3	8.31E-08
Benzo(b)fluoranthene	3.90E+00	7.49E-08			2.67E-08	0.73	1.95E-08
Benzo(g,h,i)perylene	8.40E-01	1.61E-08	0.03	5.37E-07	5.76E-09		
Benzo(k)fluoranthene	8.81E-01	1.69E-08			6.04E-09	0.073	4.41E-10
bis(2-Ethylhexyl)phthalate	2.10E+00	4.03E-08			1.44E-08	0.014	2.01E-10
Butyl benzyl phthalate	3.70E-01	7.10E-09	0.2	3.55E-08	2.53E-09		
Chrysene	2.29E+00	4.39E-08			1.57E-08	0.0073	1.15E-10
Di-n-butyl phthalate	1.50E-01	2.88E-09	0.1	2.88E-08	1.03E-09		
Dibenz(a,h)anthracene	5.40E-01	1.04E-08			3.70E-09	7.3	2.70E-08
Dibenzofuran	3.60E-01	6.90E-09	0.004	1.73E-06	2.47E-09		
Dimethyl phthalate	7.50E-02	1.44E-09	10	1.44E-10	5.14E-10		
Fluoranthene	4.20E+00	8.06E-08	0.04	2.01E-06	2.88E-08		
Fluorene	4.40E-01	8.43E-09	0.04	2.11E-07	3.01E-09		
Indeno(1,2,3-cd)pyrene	9.47E-01	1.82E-08			6.49E-09	0.73	4.74E-09
Naphthalene	4.50E-01	8.63E-09	0.03	2.88E-07	3.08E-09		
Phenanthrene	2.29E+00	4.40E-08	0.03	1.47E-06	1.57E-08		
Pyrene	3.44E+00	6.60E-08	0.03	2.20E-06	2.36E-08		
Volatile Oragnics							
2-Butanone (MEK)	1.15E-02	2.21E-10	0.6	3.69E-10	7.91E-11		
Acetone	3.38E-02	6.48E-10	0.1	6.48E-09	2.31E-10		
Carbon disulfide	4.78E-03	9.16E-11	0.1	9.16E-10	3.27E-11		
Chlorobenzene	7.80E-03	1.50E-10	0.02	7.48E-09	5.34E-11		
Chloromethane	3.30E-03	6.33E-11			2.26E-11	0.013	2.94E-13
Methylene chloride	5.24E-03	1.00E-10	0.06	1.67E-09	3.59E-11	0.0075	2.69E-13
Tetrachloroethene	5.45E-03	1.05E-10	0.01	1.05E-08	3.74E-11		
Toluene	4.82E-03	9.24E-11	0.2	4.62E-10	3.30E-11		
Trichloroethene	1.07E-02	2.05E-10	0.006	3.42E-08	7.33E-11	0.011	8.06E-13
Vinyl chloride	5.66E-03	1.09E-10			3.88E-11	1.9	7.36E-11
			HAZARD INDEX =	2.63E-02		TOTAL CANCER RISK =	8.25E-07

TABLE A-11

TINKER AFB SITE - ON-BASE EAST SOLDIER CREEK (AREA 3)
DERMAL EXPOSURE TO CHEMICALS IN SEDIMENTS
ON-BASE CONSTRUCTION WORKER -AVERAGE EXPOSURE
(FUTURE USE SCENARIO)

Equation CDI = (CS x CF x SA x AF x ABS x EF x ED)/(BW x AT1 x AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
CDI = Chronic Daily Intake
CS = Concentration in Sediments
CF = Conversion Factor (10^{-6} kg/mg)
SA = Skin Surface Area Available for Contact = 2,000 cm^2
AF = Dermal Soil Adherence Factor = 0.2 mg/cm^2
ABS = Absorption Factor = 1.0% for organics and 0.1% for inorganics
EF = Exposure Frequency = 1 day per year
ED = Exposure Duration = 5 years
BW = Body Weight = 70 kg
AT1 = Days Per Year = 365 dyas
AT2 = Averaging Time (70 years for cancer causing effects, 5 yearsfor effects other than carcinogenicit
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CS (mg/kg)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)-1	CANCER RISK (unitless)
Metals							
Antimony	5.63E+00	8.81E-11	0.0004	2.20E-07	6.29E-12		
Beryllium	3.14E-01	4.92E-12	0.005	9.84E-10	3.52E-13	4.3	1.51E-12
Cadmium	4.46E+01	6.98E-10	0.001	6.98E-07	4.99E-11		
Cobalt	7.65E+00	1.20E-10	0.06	2.00E-09	8.55E-12		
Lead	9.05E+01	1.42E-09			1.01E-10		
Mercury	3.07E-01	4.81E-12	0.0003	1.60E-08	3.43E-13		
Nickel	1.10E+02	1.73E-09	0.02	8.64E-08	1.23E-10		
Silver	8.63E+00	1.35E-10	0.005	2.70E-08	9.65E-12		
Vanadium	1.70E+01	2.67E-10	0.007	3.81E-08	1.90E-11		
PCBs/Pesticides							
Aldrin	1.25E-01	1.95E-11	0.00003	6.51E-07	1.39E-12	17	2.37E-11
Arocior 1254	4.40E+00	6.89E-10	0.00002	3.44E-05	4.92E-11		
delta-BHC	1.08E-01	1.69E-11			1.21E-12		
Heptachlor	1.05E+00	1.64E-10	0.0005	3.28E-07	1.17E-11	4.5	5.28E-11
Semivolatile organics							
1,2,4-Trichlorobenzene	4.30E-01	6.73E-11	0.01	6.73E-09	4.81E-12		
1,2-Dichlorobenzene	8.36E-01	1.31E-10	0.09	1.45E-09	9.35E-12		
1,3-Dichlorobenzene	7.68E-01	1.20E-10	0.089	1.35E-09	8.59E-12		
1,4-Dichlorobenzene	1.46E+00	2.29E-10			1.63E-11	0.024	3.92E-13
1-Chloronaphthalene	5.20E+00	8.14E-10	0.03	2.71E-08	5.81E-11		
2-Chloronaphthalene	5.85E-01	9.15E-11	0.08	1.14E-09	6.54E-12		
2-Methylnaphthalene	7.72E-01	1.21E-10	0.03	4.03E-09	8.63E-12		
4-Methylphenol	5.93E-03	9.29E-13	0.05	1.86E-11	6.63E-14		
Acenaphthene	9.11E-01	1.43E-10	0.06	2.38E-09	1.02E-11		
Acenaphthylene	6.61E-01	1.03E-10	0.03	3.45E-09	7.39E-12		
Anthracene	1.31E+00	2.05E-10	0.3	6.82E-10	1.46E-11		
Benzidine	1.19E+01	1.86E-09	0.003	6.22E-07	1.33E-10	230	3.06E-08
Benzo(a)anthracene	2.69E+00	4.21E-10			3.01E-11	0.73	2.19E-11
Benzo(a)pyrene	2.37E+00	3.71E-10			2.65E-11	7.3	1.93E-10
Benzo(b)fluoranthene	3.41E+00	5.34E-10			3.81E-11	0.73	2.78E-11
Benzo(g,h,i)perylene	1.32E+00	2.06E-10	0.03	6.87E-09	1.47E-11		
Benzo(k)fluoranthene	2.10E+00	3.29E-10			2.35E-11	0.073	1.71E-12
Benzoic acid	1.70E-01	2.66E-11	4	6.65E-12	1.90E-12		
bis(2-Ethylhexyl)phthalate	3.12E+00	4.89E-10			3.49E-11	0.014	4.89E-13
Butyl benzyl phthalate	7.81E-01	1.22E-10	0.2	6.11E-10	8.74E-12		
Chrysene	3.11E+00	4.87E-10			3.48E-11	0.0073	2.54E-13
Di-n-butyl phthalate	7.29E-01	1.14E-10	0.1	1.14E-09	8.15E-12		
Di-n-octyl phthalate	9.55E-01	1.49E-10	0.02	7.47E-09	1.07E-11		
Dibenz(a,h)anthracene	6.87E-01	1.08E-10			7.68E-12	7.3	5.61E-11
Dibenzofuran	7.96E-01	1.25E-10	0.004	3.12E-08	8.90E-12		
Dimethyl phthalate	6.13E-01	9.60E-11	10	9.60E-12	6.86E-12		
Fluoranthene	5.76E+00	9.02E-10	0.04	2.26E-08	6.44E-11		
Fluorene	7.98E-01	1.25E-10	0.04	3.12E-09	8.93E-12		
Indeno(1,2,3-cd)pyrene	1.27E+00	1.99E-10			1.42E-11	0.73	1.04E-11
Naphthalene	8.36E-01	1.31E-10	0.03	4.36E-09	9.34E-12		
Phenanthrene	4.35E+00	6.81E-10	0.03	2.27E-08	4.86E-11		
Pyrene	5.76E+00	9.02E-10	0.03	3.01E-08	6.44E-11		
Volatile Oragnics							
2-Butanone (MEK)	3.07E-02	4.80E-12	0.6	8.00E-12	3.43E-13		
Acetone	7.67E-02	1.20E-11	0.1	1.20E-10	8.58E-13		
Benzene	5.60E-03	8.77E-13			6.26E-14	0.029	1.82E-15
Carbon disulfide	8.48E-03	1.33E-12	0.1	1.33E-11	9.49E-14		
Chlorobenzene	5.84E+00	9.14E-10	0.02	4.57E-08	6.53E-11		
Ethylbenzene	1.30E-02	2.04E-12	0.1	2.04E-11	1.45E-13		
Methylene chloride	9.88E-03	1.55E-12	0.06	2.58E-11	1.10E-13	0.0075	8.28E-16
Tetrachloroethene	8.78E-03	1.37E-12	0.01	1.37E-10	9.82E-14		
Toluene	1.94E-02	3.04E-12	0.2	1.52E-11	2.17E-13		
Xylenes (total)	3.25E-02	5.09E-12	2	2.55E-12	3.64E-13		
			HAZARD INDEX =	3.73E-05	TOTAL CANCER RISK =		3.10E-08

TABLE A-12

TINKER AFB SITE - ON-BASE EAST SOLDIER CREEK (AREA 3)
DERMAL EXPOSURE TO CHEMICALS IN SEDIMENTS
ON-BASE CONSTRUCTION WORKER -RME
(FUTURE USE SCENARIO)

Equation CDI = (CS x CF x SA x AF x ABS x EF x ED)/(BW x AT1 x AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
CDI = Chronic Daily Intake
CS = Concentration in Sediments
CF = Conversion Factor (10^{-6} kg/mg)
SA = Skin Surface Area Available for Contact = 9,800 cm^2
AF = Dermal Soil Adherence Factor = 1.0 mg/cm^2
ABS = Absorption Factor = 1.0% for organics and 0.1% for inorganics
EF = Exposure Frequency = 5 days per year
ED = Exposure Duration = 25 years
BW = Body Weight = 70 kg
AT1 = Days Per Year = 365 dyas
AT2 = Averaging Time (70 years for cancer causing effects, 25 yearsfor effects other than carcinogenici
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CS (mg/kg)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)-1	CANCER RISK (unitless)
Metals							
Antimony	5.97E+00	1.14E-08	0.0004	2.86E-05	4.09E-09		
Beryllium	3.72E-01	7.14E-10	0.005	1.43E-07	2.55E-10	4.3	1.10E-09
Cadmium	1.24E+02	2.38E-07	0.001	2.38E-04	8.49E-08		
Cobalt	9.70E+00	1.86E-08	0.06	3.10E-07	6.65E-09		
Lead	1.29E+02	2.48E-07			8.84E-08		
Mercury	3.45E-01	6.61E-10	0.0003	2.20E-06	2.36E-10		
Nickel	1.65E+02	3.17E-07	0.02	1.59E-05	1.13E-07		
Silver	1.06E+01	2.04E-08	0.005	4.08E-06	7.29E-09		
Vanadium	2.00E+01	3.83E-08	0.007	5.48E-06	1.37E-08		
PCBs/Pesticides							
Aldrin	2.72E-01	5.21E-09	0.00003	1.74E-04	1.86E-09	17	3.16E-08
Aroclor 1254	1.25E+01	2.40E-07	0.00002	1.20E-02	8.57E-08		
delta-BHC	1.27E-01	2.44E-09			8.70E-10		
Heptachlor	4.50E+00	8.63E-08	0.0005	1.73E-04	3.08E-08	4.5	1.39E-07
Semivolatile organics							
1,2,4-Trichlorobenzene	4.30E-01	8.25E-09	0.01	8.25E-07	2.95E-09		
1,2-Dichlorobenzene	3.63E+00	6.96E-08	0.09	7.74E-07	2.49E-08		
1,3-Dichlorobenzene	2.79E+00	5.35E-08	0.089	6.01E-07	1.91E-08		
1,4-Dichlorobenzene	5.99E+00	1.15E-07			4.10E-08	0.024	9.84E-10
1-Chloronaphthalene	5.20E+00	9.97E-08	0.03	3.32E-06	3.56E-08		
2-Chloronaphthalene	1.40E+00	2.68E-08	0.08	3.36E-07	9.59E-09		
2-Methylnaphthalene	1.20E+00	2.30E-08	0.03	7.67E-07	8.22E-09		
4-Methylphenol	6.92E-03	1.33E-10	0.05	2.66E-09	4.74E-11		
Acenaphthene	1.21E+00	2.32E-08	0.06	3.86E-07	8.28E-09		
Acenaphthylene	3.90E+00	7.48E-08	0.03	2.49E-06	2.67E-08		
Anthracene	3.05E+00	5.85E-08	0.3	1.95E-07	2.09E-08		
Benzidine	1.19E+01	2.28E-07	0.003	7.61E-05	8.16E-08	230	1.88E-05
Benzo(a)anthracene	1.43E+01	2.74E-07			9.79E-08	0.73	7.15E-08
Benzo(a)pyrene	9.96E+00	1.91E-07			6.82E-08	7.3	4.98E-07
Benzo(b)fluoranthene	1.52E+01	2.91E-07			1.04E-07	0.73	7.59E-08
Benzo(g,h,i)perylene	3.77E+00	7.22E-08	0.03	2.41E-06	2.58E-08		
Benzo(k)fluoranthene	3.68E+00	7.06E-08			2.52E-08	0.073	1.84E-09
Benzoic acid	1.70E-01	3.26E-09	4	8.15E-10	1.16E-09		
bis(2-Ethylhexyl)phthalate	6.67E+00	1.28E-07			4.57E-08	0.014	6.39E-10
Butyl benzyl phthalate	2.14E+00	4.11E-08	0.2	2.05E-07	1.47E-08		
Chrysene	9.46E+00	1.81E-07			6.48E-08	0.0073	4.73E-10
Di-n-butyl phthalate	1.88E+00	3.60E-08	0.1	3.60E-07	1.29E-08		
Di-n-octyl phthalate	1.07E+00	2.06E-08	0.02	1.03E-06	7.34E-09		
Dibenz(a,h)anthracene	1.43E+00	2.75E-08			9.81E-09	7.3	7.16E-08
Dibenzofuran	9.86E-01	1.89E-08	0.004	4.73E-06	6.76E-09		
Dimethyl phthalate	6.60E-01	1.27E-08	10	1.27E-09	4.52E-09		
Fluoranthene	1.87E+01	3.59E-07	0.04	8.97E-06	1.28E-07		
Fluorene	1.71E+00	3.28E-08	0.04	8.20E-07	1.17E-08		
Indeno(1,2,3-cd)pyrene	3.93E+00	7.54E-08			2.69E-08	0.73	1.97E-08
Naphthalene	2.49E+00	4.78E-08	0.03	1.59E-06	1.71E-08		
Phenanthrene	1.29E+01	2.48E-07	0.03	8.28E-06	8.87E-08		
Pyrene	1.78E+01	3.42E-07	0.03	1.14E-05	1.22E-07		
Volatile Oragnics							
2-Butanone (MEK)	3.07E-02	5.88E-10	0.6	9.80E-10	2.10E-10		
Acetone	9.96E-02	1.91E-09	0.1	1.91E-08	6.82E-10		
Benzene	5.60E-03	1.07E-10			3.84E-11	0.029	1.11E-12
Carbon disulfide	8.48E-03	1.63E-10	0.1	1.63E-09	5.81E-11		
Chlorobenzene	5.84E+00	1.12E-07	0.02	5.60E-06	4.00E-08		
Ethylbenzene	1.30E-02	2.49E-10	0.1	2.49E-09	8.90E-11		
Methylene chloride	9.88E-03	1.89E-10	0.06	3.16E-09	6.77E-11	0.0075	5.07E-13
Tetrachloroethene	8.78E-03	1.68E-10	0.01	1.68E-08	6.01E-11		
Toluene	2.13E-02	4.08E-10	0.2	2.04E-09	1.46E-10		
Xylenes (total)	3.25E-02	6.24E-10	2	3.12E-10	2.23E-10		
			HAZARD INDEX =	1.28E-02	TOTAL CANCER RISK =		1.97E-05

TABLE A-13

TINKER AFB SITE - ON-BASE WEST SOLDIER CREEK (AREA 1)
DERMAL EXPOSURE TO CHEMICALS IN SEDIMENTS
ON-BASE CONSTRUCTION WORKER -AVERAGE EXPOSURE
(CURRENT USE SCENARIO)

Equation CDI = (CS x CF x SA x AF x ABS x EF x ED)/(BW x AT1 x AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
CDI = Chronic Daily Intake
CS = Concentration in Sediments
CF = Conversion Factor (10^{-6} kg/mg)
SA = Skin Surface Area Available for Contact = 2,000 cm^2
AF = Dermal Soil Adherence Factor = 0.2 mg/cm^2
ABS = Absorption Factor = 1.0% for organics and 0.1% for inorganics
EF = Exposure Frequency = 1 day per year
ED = Exposure Duration = 5 years
BW = Body Weight = 70 kg
AT1 = Days Per Year = 365 dyas
AT2 = Averaging Time (70 years for cancer causing effects, 5 yearsfor effects other than carcinogenic
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CS (mg/kg)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)-1	CANCER RISK (unitless)
Metals							
Antimony	4.60E+00	7.19E-11	0.0004	1.80E-07	5.14E-12		
Beryllium	9.76E-01	1.53E-11	0.005	3.06E-09	1.09E-12	4.3	4.69E-12
Cadmium	1.28E+01	2.00E-10	0.001	2.00E-07	1.43E-11		
Chromium	2.68E+02	4.19E-09	1	4.19E-09	2.99E-10		
Cobalt	2.17E+01	3.40E-10	0.06	5.66E-09	2.43E-11		
Lead	7.03E+01	1.10E-09			7.86E-11		
Mercury	1.43E-01	2.24E-12	0.0003	7.46E-09	1.60E-13		
Nickel	4.08E+02	6.39E-09	0.02	3.20E-07	4.57E-10		
Silver	2.08E+01	3.26E-10	0.005	6.53E-08	2.33E-11		
Thallium	3.86E-01	6.04E-12	0.00008	7.55E-08	4.32E-13		
Vanadium	3.36E+01	5.26E-10	0.007	7.51E-08	3.76E-11		
PCBs/Pesticides							
Aldrin	1.59E-02	2.48E-12	0.00003	8.27E-08	1.77E-13	17	3.01E-12
Aroclor 1254	1.98E+00	3.10E-10	0.00002	1.55E-05	2.22E-11		
Semivolatile organics							
1,2-Dichlorobenzene	6.05E-01	9.47E-11	0.09	1.05E-09	6.76E-12		
1,4-Dichlorobenzene	5.92E-01	9.26E-11			6.62E-12	0.024	1.59E-13
2,4-Dimethylphenol	5.79E-01	9.06E-11	0.02	4.53E-09	6.47E-12		
2-Methylnaphthalene	5.89E-01	9.22E-11	0.03	3.07E-09	6.59E-12		
3/4-Methylphenol	5.77E-01	9.03E-11	0.05	1.81E-09	6.45E-12		
Acenaphthene	5.98E-01	9.36E-11	0.06	1.56E-09	6.68E-12		
Anthracene	5.94E-01	9.30E-11	0.3	3.10E-10	6.64E-12		
Benzidine	4.54E+00	7.11E-10	0.003	2.37E-07	5.08E-11	230	1.17E-08
Benzo(a)anthracene	7.10E-01	1.11E-10			7.94E-12	0.73	5.79E-12
Benzo(a)pyrene	6.48E-01	1.01E-10			7.24E-12	7.3	5.29E-11
Benzo(b)fluoranthene	8.89E-01	1.39E-10			9.94E-12	0.73	7.26E-12
Benzo(g,h,i)perylene	4.48E-01	7.01E-11	0.03	2.34E-09	5.00E-12		
Benzo(k)fluoranthene	7.99E-01	1.25E-10			8.93E-12	0.073	6.52E-13
bis(2-Ethylhexyl)phthalate	1.15E+00	1.80E-10			1.28E-11	0.014	1.80E-13
Butyl benzyl phthalate	5.95E-01	9.31E-11	0.2	4.65E-10	6.65E-12		
Chrysene	7.07E-01	1.11E-10			7.90E-12	0.0073	5.77E-14
Di-n-butyl phthalate	5.96E-01	9.33E-11	0.1	9.33E-10	6.66E-12		
Dibenz(a,h)anthracene	5.96E-01	9.33E-11			6.66E-12	7.3	4.86E-11
Dibenzofuran	5.95E-01	9.31E-11	0.004	2.33E-08	6.65E-12		
Dimethyl phthalate	5.81E-01	9.10E-11	10	9.10E-12	6.50E-12		
Fluoranthene	1.09E+00	1.70E-10	0.04	4.25E-09	1.21E-11		
Fluorene	5.98E-01	9.37E-11	0.04	2.34E-09	6.69E-12		
Indeno(1,2,3-cd)pyrene	5.54E-01	8.67E-11			6.20E-12	0.73	4.52E-12
Naphthalene	6.01E-01	9.40E-11	0.03	3.13E-09	6.72E-12		
Phenanthrene	1.05E+00	1.65E-10	0.03	5.48E-09	1.18E-11		
Pyrene	1.01E+00	1.57E-10	0.03	5.25E-09	1.12E-11		
Volatile Oragnics							
2-Butanone (MEK)	8.84E-03	1.38E-12	0.6	2.31E-12	9.89E-14		
Acetone	2.20E-02	3.44E-12	0.1	3.44E-11	2.46E-13		
Carbon disulfide	3.97E-03	6.22E-13	0.1	6.22E-12	4.44E-14		
Chlorobenzene	4.20E-03	6.58E-13	0.02	3.29E-11	4.70E-14		
Chloromethane	8.48E-03	1.33E-12			9.48E-14	0.013	1.23E-15
Methylene chloride	4.29E-03	6.71E-13	0.06	1.12E-11	4.79E-14	0.0075	3.59E-16
Tetrachloroethene	4.38E-03	6.85E-13	0.01	6.85E-11	4.89E-14		
Toluene	4.46E-03	6.99E-13	0.2	3.49E-12	4.99E-14		
Trichloroethene	4.70E-03	7.35E-13	0.006	1.23E-10	5.25E-14	0.011	5.78E-16
Vinyl chloride	8.48E-03	1.33E-12			9.48E-14	1.9	1.80E-13
			HAZARD INDEX =	1.68E-05		TOTAL CANCER RISK =	1.18E-08

TABLE A-14

TINKER AFB SITE - ON-BASE WEST SOLDIER CREEK (AREA 1)
DERMAL EXPOSURE TO CHEMICALS IN SEDIMENTS
ON-BASE CONSTRUCTION WORKER -RME
(CURRENT USE SCENARIO)

Equation CDI = (CS x CF x SA x AF x ABS x EF x ED)/(BW x AT1 x AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
CDI = Chronic Daily Intake
CS = Concentration in Sediments
CF = Conversion Factor (10^{-6} kg/mg)
SA = Skin Surface Area Available for Contact = 9,800 cm^2
AF = Dermal Soil Adherence Factor = 1.0 mg/cm^2
ABS = Absorption Factor = 1.0% for organics and 0.1% for inorganics
EF = Exposure Frequency = 5 days per year
ED = Exposure Duration = 25 years
BW = Body Weight = 70 kg
AT1 = Days Per Year = 365 dyas
AT2 = Averaging Time (70 years for cancer causing effects, 25 yearsfor effects other than carcinogeni
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CS (mg/kg)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)-1	CANCER RISK (unitless)
Metals							
Antimony	5.17E+00	9.92E-09	0.0004	2.48E-05	3.54E-09		
Beryllium	1.20E+00	2.29E-09	0.005	4.59E-07	8.20E-10	4.3	3.52E-09
Cadmium	6.19E+01	1.19E-07	0.001	1.19E-04	4.24E-08		
Chromium	6.68E+02	1.28E-06	1	1.28E-06	4.58E-07		
Cobalt	3.02E+01	5.79E-08	0.06	9.66E-07	2.07E-08		
Lead	1.21E+02	2.33E-07			8.31E-08		
Mercury	1.92E-01	3.68E-10	0.0003	1.23E-06	1.31E-10		
Nickel	1.20E+03	2.31E-06	0.02	1.15E-04	8.24E-07		
Silver	1.02E+02	1.95E-07	0.005	3.90E-05	6.97E-08		
Thallium	5.01E-01	9.61E-10	0.00008	1.20E-05	3.43E-10		
Vanadium	3.90E+01	7.47E-08	0.007	1.07E-05	2.67E-08		
PCBs/Pesticides							
Aldrin	3.38E-02	6.47E-10	0.00003	2.16E-05	2.31E-10	17	3.93E-09
Aroclor 1254	2.40E+01	4.60E-07	0.00002	2.30E-02	1.64E-07		
Semivolatile organics							
1,2-Dichlorobenzene	7.57E-01	1.45E-08	0.09	1.61E-07	5.18E-09		
1,4-Dichlorobenzene	7.93E-01	1.52E-08			5.43E-09	0.024	1.30E-10
2,4-Dimethylphenol	8.54E-01	1.64E-08	0.02	8.19E-07	5.85E-09		
2-Methylnaphthalene	7.80E-01	1.50E-08	0.03	4.99E-07	5.34E-09		
3/4-Methylphenol	8.29E-01	1.59E-08	0.05	3.18E-07	5.68E-09		
Acenaphthene	9.07E-01	1.74E-08	0.06	2.90E-07	6.22E-09		
Anthracene	8.22E-01	1.58E-08	0.3	5.26E-08	5.63E-09		
Benzidine	5.65E+00	1.08E-07	0.003	3.61E-05	3.87E-08	230	8.90E-06
Benzo(a)anthracene	1.32E+00	2.54E-08			9.05E-09	0.73	6.61E-09
Benzo(a)pyrene	1.16E+00	2.22E-08			7.92E-09	7.3	5.78E-08
Benzo(b)fluoranthene	3.00E+00	5.75E-08			2.05E-08	0.73	1.50E-08
Benzo(g,h,i)perylene	7.11E-01	1.36E-08	0.03	4.55E-07	4.87E-09		
Benzo(k)fluoranthene	1.52E+00	2.92E-08			1.04E-08	0.073	7.60E-10
bis(2-Ethylhexyl)phthalate	2.10E+00	4.04E-08			1.44E-08	0.014	2.02E-10
Butyl benzyl phthalate	7.42E-01	1.42E-08	0.2	7.12E-08	5.08E-09		
Chrysene	1.77E+00	3.40E-08			1.21E-08	0.0073	8.86E-11
Di-n-butyl phthalate	7.50E-01	1.44E-08	0.1	1.44E-07	5.14E-09		
Dibenz(a,h)anthracene	8.04E-01	1.54E-08			5.50E-09	7.3	4.02E-08
Dibenzofuran	8.11E-01	1.55E-08	0.004	3.89E-06	5.55E-09		
Dimethyl phthalate	8.63E-01	1.66E-08	10	1.66E-09	5.91E-09		
Fluoranthene	3.37E+00	6.46E-08	0.04	1.62E-06	2.31E-08		
Fluorene	8.11E-01	1.55E-08	0.04	3.89E-07	5.55E-09		
Indeno(1,2,3-cd)pyrene	1.02E+00	1.96E-08			7.01E-09	0.73	5.12E-09
Naphthalene	8.05E-01	1.54E-08	0.03	5.15E-07	5.52E-09		
Phenanthrene	2.59E+00	4.96E-08	0.03	1.65E-06	1.77E-08		
Pyrene	3.08E+00	5.91E-08	0.03	1.97E-06	2.11E-08		
Volatile Oragnics							
2-Butanone (MEK)	1.06E-02	2.03E-10	0.6	3.39E-10	7.26E-11		
Acetone	3.93E-02	7.54E-10	0.1	7.54E-09	2.69E-10		
Carbon disulfide	4.54E-03	8.71E-11	0.1	8.71E-10	3.11E-11		
Chlorobenzene	4.88E-03	9.37E-11	0.02	4.68E-09	3.34E-11		
Chloromethane	9.87E-03	1.89E-10			6.76E-11	0.013	8.79E-13
Methylene chloride	5.51E-03	1.06E-10	0.06	1.76E-09	3.78E-11	0.0075	2.83E-13
Tetrachloroethene	5.15E-03	9.87E-11	0.01	9.87E-09	3.53E-11		
Toluene	5.48E-03	1.05E-10	0.2	5.26E-10	3.76E-11		
Trichloroethene	5.67E-03	1.09E-10	0.006	1.81E-08	3.88E-11	0.011	4.27E-13
Vinyl chloride	9.87E-03	1.89E-10			6.76E-11	1.9	1.28E-10
			HAZARD INDEX =	2.34E-02	TOTAL CANCER RISK =		9.03E-06

TABLE A-15

TINKER AFB SITE - ON-BASE EAST SOLDIER CREEK (AREA 3)
DERMAL EXPOSURE TO CHEMICALS IN SEDIMENTS
ON-BASE CONSTRUCTION WORKER -AVERAGE EXPOSURE
(CURRENT USE SCENARIO)

Equation **CDI = (CS x CF x SA x AF x ABS x EF x ED)/(BW x AT1 x AT2)**
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
CDI = Chronic Daily Intake
CS = Concentration in Sediments
CF = Conversion Factor (10^{-6} kg/mg)
SA = Skin Surface Area Available for Contact = 2,000 cm^2
AF = Dermal Soil Adherence Factor = 0.2 mg/cm^2
ABS = Absorption Factor = 1.0% for organics and 0.1% for inorganics
EF = Exposure Frequency = 1 day per year
ED = Exposure Duration = 5 years
BW = Body Weight = 70 kg
AT1 = Days Per Year = 365 dyas
AT2 = Averaging Time (70 years for cancer causing effects, 5 yearsfor effects other than carcinogenicit
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CS (mg/kg)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)-1	CANCER RISK (unitless)
Metals							
Antimony	5.56E+00	8.70E-11	0.0004	2.18E-07	6.22E-12		
Beryllium	3.05E-01	4.77E-12	0.005	9.55E-10	3.41E-13	4.3	1.47E-12
Cadmium	3.38E+01	5.30E-10	0.001	5.30E-07	3.78E-11		
Cobalt	7.25E+00	1.14E-10	0.06	1.89E-09	8.11E-12		
Lead	8.92E+01	1.40E-09			9.97E-11		
Mercury	2.53E-01	3.97E-12	0.0003	1.32E-08	2.83E-13		
Nickel	1.04E+02	1.63E-09	0.02	8.16E-08	1.17E-10		
Silver	4.94E+00	7.73E-11	0.005	1.55E-08	5.52E-12		
Vanadium	1.79E+01	2.80E-10	0.007	4.00E-08	2.00E-11		
PCBs/Pesticides							
Aldrin	1.49E-01	2.33E-11	0.00003	7.75E-07	1.66E-12	17	2.82E-11
Aroclor 1254	6.31E+00	9.87E-10	0.00002	4.94E-05	7.05E-11		
delta-BHC	1.38E-01	2.16E-11			1.54E-12		
Heptachlor	2.53E+00	3.96E-10	0.0005	7.92E-07	2.83E-11	4.5	1.27E-10
Semivolatile organics							
1,2,4-Trichlorobenzene	7.84E-01	1.23E-10	0.01	1.23E-08	8.77E-12		
1,2-Dichlorobenzene	7.89E-01	1.23E-10	0.09	1.37E-09	8.82E-12		
1,3-Dichlorobenzene	7.85E-01	1.23E-10	0.089	1.38E-09	8.77E-12		
1,4-Dichlorobenzene	7.84E-01	1.23E-10			8.77E-12	0.024	2.11E-13
1-Chloronaphthalene	6.27E+00	9.81E-10	0.03	3.27E-08	7.01E-11		
2-Chloronaphthalene	7.49E-01	1.17E-10	0.08	1.47E-09	8.38E-12		
2-Methylnaphthalene	7.32E-01	1.15E-10	0.03	3.82E-09	8.18E-12		
4-Methylphenol	9.67E-03	1.51E-12	0.05	3.03E-11	1.08E-13		
Acenaphthene	9.72E-01	1.52E-10	0.06	2.54E-09	1.09E-11		
Acenaphthylene	9.11E-01	1.43E-10	0.03	4.75E-09	1.02E-11		
Anthracene	1.79E+00	2.80E-10	0.3	9.35E-10	2.00E-11		
Benzidine	1.57E+01	2.45E-09	0.003	8.18E-07	1.75E-10	230	4.03E-08
Benzo(a)anthracene	3.71E+00	5.80E-10			4.14E-11	0.73	3.03E-11
Benzo(a)pyrene	3.10E+00	4.85E-10			3.46E-11	7.3	2.53E-10
Benzo(b)fluoranthene	3.89E+00	6.10E-10			4.35E-11	0.73	3.18E-11
Benzo(g,h,i)perylene	1.81E+00	2.84E-10	0.03	9.46E-09	2.03E-11		
Benzo(k)fluoranthene	3.40E+00	5.32E-10			3.80E-11	0.073	2.77E-12
Benzoic acid	6.23E+00	9.76E-10	4	2.44E-10	6.97E-11		
bis(2-Ethylhexyl)phthalate	2.84E+00	4.45E-10			3.18E-11	0.014	4.45E-13
Butyl benzyl phthalate	9.68E-01	1.52E-10	0.2	7.58E-10	1.08E-11		
Chrysene	4.18E+00	6.54E-10			4.67E-11	0.0073	3.41E-13
Di-n-butyl phthalate	7.99E-01	1.25E-10	0.1	1.25E-09	8.94E-12		
Di-n-octyl phthalate	7.78E-01	1.22E-10	0.02	6.09E-09	8.70E-12		
Dibenz(a,h)anthracene	8.57E-01	1.34E-10			9.58E-12	7.3	6.99E-11
Dibenzofuran	8.21E-01	1.29E-10	0.004	3.21E-08	9.19E-12		
Dimethyl phthalate	6.70E-01	1.05E-10	10	1.05E-11	7.49E-12		
Fluoranthene	7.22E+00	1.13E-09	0.04	2.82E-08	8.07E-11		
Fluorene	9.94E-01	1.56E-10	0.04	3.89E-09	1.11E-11		
Indeno(1,2,3-cd)pyrene	1.70E+00	2.66E-10			1.90E-11	0.73	1.39E-11
Naphthalene	9.40E-01	1.47E-10	0.03	4.91E-09	1.05E-11		
Phenanthrene	5.65E+00	8.85E-10	0.03	2.95E-08	6.32E-11		
Pyrene	7.08E+00	1.11E-09	0.03	3.70E-08	7.92E-11		
Volatile Organics							
2-Butanone (MEK)	3.81E-02	5.96E-12	0.6	9.94E-12	4.26E-13		
Acetone	7.39E-02	1.16E-11	0.1	1.16E-10	8.26E-13		
Benzene	1.28E-02	2.01E-12			1.44E-13	0.029	4.17E-15
Carbon disulfide	9.98E-03	1.56E-12	0.1	1.56E-11	1.12E-13		
Chlorobenzene	1.22E-01	1.92E-11	0.02	9.58E-10	1.37E-12		
Ethylbenzene	1.37E-02	2.14E-12	0.1	2.14E-11	1.53E-13		
Methylene chloride	1.08E-02	1.70E-12	0.06	2.83E-11	1.21E-13	0.0075	9.10E-16
Tetrachloroethene	1.15E-02	1.80E-12	0.01	1.80E-10	1.29E-13		
Toluene	1.58E-02	2.47E-12	0.2	1.24E-11	1.77E-13		
Xylenes (total)	1.25E-02	1.96E-12	2	9.78E-13	1.40E-13		
			HAZARD INDEX =	5.29E-05	TOTAL CANCER RISK =		4.09E-08

TABLE A-16

TINKER AFB SITE - ON-BASE EAST SOLDIER CREEK (AREA 3)
DERMAL EXPOSURE TO CHEMICALS IN SEDIMENTS
ON-BASE CONSTRUCTION WORKER -RME
(CURRENT USE SCENARIO)

Equation CDI = (CS x CF x SA x AF x ABS x EF x ED)/(BW x AT1 x AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
CDI = Chronic Daily Intake
CS = Concentration in Sediments
CF = Conversion Factor (10^{-6} kg/mg)
SA = Skin Surface Area Available for Contact = 9,800 cm^2
AF = Dermal Soil Adherence Factor = 1.0 mg/cm^2
ABS = Absorption Factor = 1.0% for organics and 0.1% for inorganics
EF = Exposure Frequency = 5 days per year
ED = Exposure Duration = 25 years
BW = Body Weight = 70 kg
AT1 = Days Per Year = 365 dyas
AT2 = Averaging Time (70 years for cancer causing effects, 25 yearsfor effects other than carcinogenici
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CS (mg/kg)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)-1	CANCER RISK (unitless)
Metals							
Antimony	5.56E+00	1.07E-08	0.0004	2.67E-05	3.81E-09		
Beryllium	3.05E-01	5.85E-10	0.005	1.17E-07	2.09E-10	4.3	8.98E-10
Cadmium	3.38E+01	6.49E-08	0.001	6.49E-05	2.32E-08		
Cobalt	7.25E+00	1.39E-08	0.06	2.32E-07	4.97E-09		
Lead	8.92E+01	1.71E-07			6.11E-08		
Mercury	2.53E-01	4.86E-10	0.0003	1.62E-06	1.74E-10		
Nickel	1.04E+02	2.00E-07	0.02	1.00E-05	7.14E-08		
Silver	4.94E+00	9.47E-09	0.005	1.89E-06	3.38E-09		
Vanadium	1.79E+01	3.43E-08	0.007	4.90E-06	1.22E-08		
PCBs/Pesticides							
Aldrin	1.49E-01	2.85E-09	0.00003	9.50E-05	1.02E-09	17	1.73E-08
Aroclor 1254	6.31E+00	1.21E-07	0.00002	6.05E-03	4.32E-08		
delta-BHC	1.38E-01	2.65E-09			9.45E-10		
Heptachlor	2.53E+00	4.85E-08	0.0005	9.70E-05	1.73E-08	4.5	7.79E-08
Semivolatile organics							
1,2,4-Trichlorobenzene	7.84E-01	1.50E-08	0.01	1.50E-06	5.37E-09		
1,2-Dichlorobenzene	7.89E-01	1.51E-08	0.09	1.68E-07	5.40E-09		
1,3-Dichlorobenzene	7.85E-01	1.50E-08	0.089	1.69E-07	5.37E-09		
1,4-Dichlorobenzene	7.84E-01	1.50E-08			5.37E-09	0.024	1.29E-10
1-Chloronaphthalene	6.27E+00	1.20E-07	0.03	4.01E-06	4.29E-08		
2-Chloronaphthalene	7.49E-01	1.44E-08	0.08	1.80E-07	5.13E-09		
2-Methylnaphthalene	7.32E-01	1.40E-08	0.03	4.68E-07	5.01E-09		
4-Methylphenol	9.67E-03	1.85E-10	0.05	3.71E-09	6.62E-11		
Acenaphthene	9.72E-01	1.86E-08	0.06	3.11E-07	6.66E-09		
Acenaphthylene	9.11E-01	1.75E-08	0.03	5.82E-07	6.24E-09		
Anthracene	1.79E+00	3.44E-08	0.3	1.15E-07	1.23E-08		
Benzidine	1.57E+01	3.00E-07	0.003	1.00E-04	1.07E-07	230	2.47E-05
Benzo(a)anthracene	3.71E+00	7.11E-08			2.54E-08	0.73	1.85E-08
Benzo(a)pyrene	3.10E+00	5.94E-08			2.12E-08	7.3	1.55E-07
Benzo(b)fluoranthene	3.89E+00	7.47E-08			2.67E-08	0.73	1.95E-08
Benzo(g,h,i)perylene	1.81E+00	3.48E-08	0.03	1.16E-06	1.24E-08		
Benzo(k)fluoranthene	3.40E+00	6.51E-08			2.33E-08	0.073	1.70E-09
Benzoic acid	6.23E+00	1.20E-07	4	2.99E-08	4.27E-08		
bis(2-Ethylhexyl)phthalate	2.84E+00	5.45E-08			1.95E-08	0.014	2.72E-10
Butyl benzyl phthalate	9.68E-01	1.86E-08	0.2	9.29E-08	6.63E-09		
Chrysene	4.18E+00	8.02E-08			2.86E-08	0.0073	2.09E-10
Di-n-butyl phthalate	7.99E-01	1.53E-08	0.1	1.53E-07	5.47E-09		
Di-n-octyl phthalate	7.78E-01	1.49E-08	0.02	7.46E-07	5.33E-09		
Dibenz(a,h)anthracene	8.57E-01	1.64E-08			5.87E-09	7.3	4.28E-08
Dibenzofuran	8.21E-01	1.58E-08	0.004	3.94E-06	5.63E-09		
Dimethyl phthalate	6.70E-01	1.29E-08	10	1.29E-09	4.59E-09		
Fluoranthene	7.22E+00	1.38E-07	0.04	3.46E-06	4.94E-08		
Fluorene	9.94E-01	1.91E-08	0.04	4.77E-07	6.81E-09		
Indeno(1,2,3-cd)pyrene	1.70E+00	3.25E-08			1.16E-08	0.73	8.48E-09
Naphthalene	9.40E-01	1.80E-08	0.03	6.01E-07	6.44E-09		
Phenanthrene	5.65E+00	1.08E-07	0.03	3.61E-06	3.87E-08		
Pyrene	7.08E+00	1.36E-07	0.03	4.53E-06	4.85E-08		
Volatile Organics							
2-Butanone (MEK)	3.81E-02	7.30E-10	0.6	1.22E-09	2.61E-10		
Acetone	7.39E-02	1.42E-09	0.1	1.42E-08	5.06E-10		
Benzene	1.28E-02	2.46E-10			8.80E-11	0.029	2.55E-12
Carbon disulfide	9.98E-03	1.91E-10	0.1	1.91E-09	6.83E-11		
Chlorobenzene	1.22E-01	2.35E-09	0.02	1.17E-07	8.38E-10		
Ethylbenzene	1.37E-02	2.63E-10	0.1	2.63E-09	9.38E-11		
Methylene chloride	1.08E-02	2.08E-10	0.06	3.47E-09	7.43E-11	0.0075	5.57E-13
Tetrachloroethene	1.15E-02	2.21E-10	0.01	2.21E-08	7.89E-11		
Toluene	1.58E-02	3.03E-10	0.2	1.52E-09	1.08E-10		
Xylenes (total)	1.25E-02	2.40E-10	2	1.20E-10	8.56E-11		
			HAZARD INDEX =	6.48E-03	TOTAL CANCER RISK =		2.50E-05

TABLE A-17

TINKER AFB SITE - ON-BASE WEST SOLDIER CREEK (AREA 1)
INGESTION EXPOSURE TO CHEMICALS IN SEDIMENTS
ON-BASE CONSTRUCTION WORKER -AVERAGE EXPOSURE
(FUTURE USE SCENARIO)

Equation : CDI = (CS x CF x IR x EF x ED)/(BW x AT1 x AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
CDI = Chronic Daily Intake
CS = Concentration in Sediments
CF = Conversion Factor (10^{-6} kg/mg)
IR = Sediment Ingestion Rate = 10 mg/day
EF = Exposure Frequency = 1 day per year
ED = Exposure Duration = 5 years
BW = Body Weight = 70 kg
AT1 = Days Per Year = 365 days
AT2 = Average Time (70 years for cancer causing effects, 5 yearsfor effects other than carcinogenicity)
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CS (mg/kg)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)-1	CANCER RISK (unitless)
Metals							
Antimony	4.39E+00	1.72E-09	0.0004	4.29E-06	1.23E-10		
Beryllium	8.76E-01	3.43E-10	0.005	6.86E-08	2.45E-11	4.3	1.05E-10
Cadmium	1.98E+01	7.77E-09	0.001	7.77E-06	5.55E-10		
Chromium	4.14E+02	1.62E-07	1	1.62E-07	1.16E-08		
Cobalt	2.42E+01	9.48E-09	0.06	1.58E-07	6.77E-10		
Lead	9.71E+01	3.80E-08			2.71E-09		
Mercury	1.22E-01	4.77E-11	0.0003	1.59E-07	3.41E-12		
Nickel	3.79E+02	1.48E-07	0.02	7.41E-06	1.06E-08		
Silver	1.86E+01	7.29E-09	0.005	1.46E-06	5.21E-10		
Thallium	2.00E-01	7.83E-11	0.00008	9.78E-07	5.59E-12		
Vanadium	3.33E+01	1.31E-08	0.007	1.86E-06	9.32E-10		
PCBs/Pesticides							
Aldrin	1.10E-02	4.31E-12	0.00003	1.44E-07	3.08E-13	17	5.23E-12
Aroclor 1254	2.96E+00	1.16E-09	0.00002	5.80E-05	8.29E-11		
Semivolatile organics							
1,2-Dichlorobenzene	4.62E-01	1.81E-10	0.09	2.01E-09	1.29E-11		
1,4-Dichlorobenzene	2.10E-01	8.22E-11			5.87E-12	0.024	1.41E-13
2,4-Dimethylphenol	3.50E-01	1.37E-10	0.02	6.85E-09	9.78E-12		
2-Methylnaphthalene	1.50E-01	5.87E-11	0.03	1.96E-09	4.19E-12		
3/4-Methylphenol	2.20E-01	8.61E-11	0.05	1.72E-09	6.15E-12		
Acenaphthene	4.28E-01	1.68E-10	0.06	2.79E-09	1.20E-11		
Anthracene	4.50E-01	1.76E-10	0.3	5.87E-10	1.26E-11		
Benzidine	4.30E-01	1.68E-10	0.003	5.61E-08	1.20E-11	230	2.76E-09
Benzo(a)anthracene	8.47E-01	3.32E-10			2.37E-11	0.73	1.73E-11
Benzo(a)pyrene	9.05E-01	3.54E-10			2.53E-11	7.3	1.85E-10
Benzo(b)fluoranthene	1.44E+00	5.64E-10			4.03E-11	0.73	2.94E-11
Benzo(g,h,i)perylene	5.63E-01	2.20E-10	0.03	7.34E-09	1.57E-11		
Benzo(k)fluoranthene	6.51E-01	2.55E-10			1.82E-11	0.073	1.33E-12
bis(2-Ethylhexyl)phthalate	1.35E+00	5.30E-10			3.79E-11	0.014	5.30E-13
Butyl benzyl phthalate	3.70E-01	1.45E-10	0.2	7.24E-10	1.03E-11		
Chrysene	9.96E-01	3.90E-10			2.78E-11	0.0073	2.03E-13
Di-n-butyl phthalate	1.50E-01	5.87E-11	0.1	5.87E-10	4.19E-12		
Dibenz(a,h)anthracene	4.88E-01	1.91E-10			1.37E-11	7.3	9.96E-11
Dibenzofuran	3.60E-01	1.41E-10	0.004	3.52E-08	1.01E-11		
Dimethyl phthalate	7.50E-02	2.94E-11	10	2.94E-12	2.10E-12		
Fluoranthene	1.66E+00	6.48E-10	0.04	1.62E-08	4.63E-11		
Fluorene	4.25E-01	1.66E-10	0.04	4.16E-09	1.19E-11		
Indeno(1,2,3-cd)pyrene	5.97E-01	2.34E-10			1.67E-11	0.73	1.22E-11
Naphthalene	4.50E-01	1.76E-10	0.03	5.87E-09	1.26E-11		
Phenanthrene	1.21E+00	4.72E-10	0.03	1.57E-08	3.37E-11		
Pyrene	1.41E+00	5.50E-10	0.03	1.83E-08	3.93E-11		
Volatile Oragnics							
2-Butanone (MEK)	1.00E-02	3.92E-12	0.6	6.54E-12	2.80E-13		
Acetone	2.41E-02	9.43E-12	0.1	9.43E-11	6.73E-13		
Carbon disulfide	4.42E-03	1.73E-12	0.1	1.73E-11	1.24E-13		
Chlorobenzene	7.80E-03	3.05E-12	0.02	1.53E-10	2.18E-13		
Chloromethane	3.30E-03	1.29E-12			9.23E-14	0.013	1.20E-15
Methylene chlonde	4.45E-03	1.74E-12	0.06	2.91E-11	1.25E-13	0.0075	9.34E-16
Tetrachloroethene	4.96E-03	1.94E-12	0.01	1.94E-10	1.39E-13		
Toluene	4.24E-03	1.66E-12	0.2	8.31E-12	1.19E-13		
Trichloroethene	6.75E-03	2.64E-12	0.006	4.40E-10	1.89E-13	0.011	2.07E-15
Vinyl chlonde	5.66E-03	2.21E-12			1.58E-13	1.9	3.01E-13
			HAZARD INDEX =	8.26E-05		TOTAL CANCER RISK =	3.22E-09

TABLE A-18

TINKER AFB SITE - ON-BASE WEST SOLDIER CREEK (AREA 1)
INGESTION EXPOSURE TO CHEMICALS IN SEDIMENTS
ON-BASE CONSTRUCTION WORKER -RME
(FUTURE USE SCENARIO)

Equation : CDI = (CS x CF x IR x EF x ED)/(BW x AT1 x AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
- CDI = Chronic Daily Intake
- CS = Concentration in Sediments
- CF = Conversion Factor (10^{-6} kg/mg)
- IR = Sediment Ingestion Rate = 50 mg/day
- EF = Exposure Frequency = 5 days per year
- ED = Exposure Duration = 25 years
- BW = Body Weight = 70 kg
- AT1 = Days Per Year = 365 days
- AT2 = Average Time (70 years for cancer causing effects, 25 yearsfor effects other than carcinogenicity)
- SF = Slope Factor
- RfD = Reference Dose

CHEMICALS OF CONCERN	CS (mg/kg)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)-1	CANCER RISK (unitless)
Metals							
Antimony	4.70E+00	4.60E-08	0.0004	1.15E-04	1.64E-08		
Beryllium	1.00E+00	9.83E-09	0.005	1.97E-06	3.51E-09	4.3	1.51E-08
Cadmium	6.88E+01	6.73E-07	0.001	6.73E-04	2.40E-07		
Chromium	7.64E+02	7.48E-06	1	7.48E-06	2.67E-06		
Cobalt	3.10E+01	3.03E-07	0.06	5.05E-06	1.08E-07		
Lead	1.62E+02	1.58E-06			5.65E-07		
Mercury	1.39E-01	1.36E-09	0.0003	4.55E-06	4.87E-10		
Nickel	7.55E+02	7.39E-06	0.02	3.70E-04	2.64E-06		
Silver	5.12E+01	5.01E-07	0.005	1.00E-04	1.79E-07		
Thallium	2.00E-01	1.96E-09	0.00008	2.45E-05	6.99E-10		
Vanadium	3.73E+01	3.65E-07	0.007	5.22E-05	1.30E-07		
PCBs/Pesticides							
Aldrin	1.10E-02	1.08E-10	0.00003	3.59E-06	3.84E-11	17	6.53E-10
Aroclor 1254	2.71E+01	2.65E-07	0.00002	1.33E-02	9.47E-08		
Semivolatile organics							
1,2-Dichlorobenzene	5.07E-01	4.96E-09	0.09	5.52E-08	1.77E-09		
1,4-Dichlorobenzene	2.10E-01	2.05E-09			7.34E-10	0.024	1.76E-11
2,4-Dimethylphenol	3.50E-01	3.42E-09	0.02	1.71E-07	1.22E-09		
2-Methylnaphthalene	1.50E-01	1.47E-09	0.03	4.89E-08	5.24E-10		
3/4-Methylphenol	2.20E-01	2.15E-09	0.05	4.31E-08	7.69E-10		
Acenaphthene	4.60E-01	4.50E-09	0.06	7.50E-08	1.61E-09		
Anthracene	5.49E-01	5.37E-09	0.3	1.79E-08	1.92E-09		
Benzidine	4.30E-01	4.21E-09	0.003	1.40E-06	1.50E-09	230	3.46E-07
Benzo(a)anthracene	1.63E+00	1.60E-08			5.70E-09	0.73	4.16E-09
Benzo(a)pyrene	1.66E+00	1.63E-08			5.81E-09	7.3	4.24E-08
Benzo(b)fluoranthene	3.90E+00	3.82E-08			1.36E-08	0.73	9.96E-09
Benzo(g,h,i)perylene	8.40E-01	8.22E-09	0.03	2.74E-07	2.94E-09		
Benzo(k)fluoranthene	8.81E-01	8.62E-09			3.08E-09	0.073	2.25E-10
bis(2-Ethylhexyl)phthalate	2.10E+00	2.05E-08			7.34E-09	0.014	1.03E-10
Butyl benzyl phthalate	3.70E-01	3.62E-09	0.2	1.81E-08	1.29E-09		
Chrysene	2.29E+00	2.24E-08			8.01E-09	0.0073	5.85E-11
Di-n-butyl phthalate	1.50E-01	1.47E-09	0.1	1.47E-08	5.24E-10		
Dibenz(a,h)anthracene	5.40E-01	5.28E-09			1.89E-09	7.3	1.38E-08
Dibenzofuran	3.60E-01	3.52E-09	0.004	8.81E-07	1.26E-09		
Dimethyl phthalate	7.50E-02	7.34E-10	10	7.34E-11	2.62E-10		
Fluoranthene	4.20E+00	4.11E-08	0.04	1.03E-06	1.47E-08		
Fluorene	4.40E-01	4.30E-09	0.04	1.08E-07	1.54E-09		
Indeno(1,2,3-cd)pyrene	9.47E-01	9.27E-09			3.31E-09	0.73	2.42E-09
Naphthalene	4.50E-01	4.40E-09	0.03	1.47E-07	1.57E-09		
Phenanthrene	2.29E+00	2.24E-08	0.03	7.48E-07	8.01E-09		
Pyrene	3.44E+00	3.37E-08	0.03	1.12E-06	1.20E-08		
Volatile Oragnics							
2-Butanone (MEK)	1.15E-02	1.13E-10	0.6	1.88E-10	4.03E-11		
Acetone	3.38E-02	3.31E-10	0.1	3.31E-09	1.18E-10		
Carbon disulfide	4.78E-03	4.68E-11	0.1	4.68E-10	1.67E-11		
Chlorobenzene	7.80E-03	7.63E-11	0.02	3.81E-09	2.72E-11		
Chloromethane	3.30E-03	3.23E-11			1.15E-11	0.013	1.50E-13
Methylene chloride	5.24E-03	5.12E-11	0.06	8.54E-10	1.83E-11	0.0075	1.37E-13
Tetrachloroethene	5.45E-03	5.34E-11	0.01	5.34E-09	1.91E-11		
Toluene	4.82E-03	4.71E-11	0.2	2.36E-10	1.68E-11		
Trichloroethene	1.07E-02	1.05E-10	0.006	1.74E-08	3.74E-11	0.011	4.11E-13
Vinyl chloride	5.66E-03	5.54E-11			1.98E-11	1.9	3.76E-11
			HAZARD INDEX =	1.46E-02	TOTAL CANCER RISK =		4.35E-07

TABLE A-19

TINKER AFB SITE - ON-BASE EAST SOLDIER CREEK (AREA 3)
INGESTION EXPOSURE TO CHEMICALS IN SEDIMENTS
ON-BASE CONSTRUCTION WORKER -AVERAGE EXPOSURE
(FUTURE USE SCENARIO)

Equation CDI = (CS x CF x IR x EF x ED)/(BW x AT1 x AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
CDI = Chronic Daily Intake
CS = Concentration in Sediments
CF = Conversion Factor (10^{-6} kg/mg)
IR = Sediment Ingestion Rate = 10 mg/day
EF = Exposure Frequency = 1 day per year
ED = Exposure Duration = 5 years
BW = Body Weight = 70 kg
AT1 = Days Per Year = 365 days
AT2 = Average Time (70 years for cancer causing effects, 5 yearsfor effects other than carcinogenicity)
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CS (mg/kg)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)-1	CANCER RISK (unitless)
Metals							
Antimony	5.63E+00	2.20E-09	0.0004	5.50E-06	1.57E-10		
Beryllium	3.14E-01	1.23E-10	0.005	2.46E-08	8.79E-12	4.3	3.78E-11
Cadmium	4.46E+01	1.75E-08	0.001	1.75E-05	1.25E-09		
Cobalt	7.65E+00	2.99E-09	0.06	4.99E-08	2.14E-10		
Lead	9.05E+01	3.54E-08			2.53E-09		
Mercury	3.07E-01	1.20E-10	0.0003	4.01E-07	8.59E-12		
Nickel	1.10E+02	4.32E-08	0.02	2.16E-06	3.09E-09		
Silver	8.63E+00	3.38E-09	0.005	6.76E-07	2.41E-10		
Vanadium	1.70E+01	6.66E-09	0.007	9.52E-07	4.76E-10		
PCBs/Pesticides							
Aldrin	1.25E-01	4.88E-11	0.00003	1.63E-06		17	
Aroclor 1254	4.40E+00	1.72E-09	0.00002	8.61E-05	1.23E-10		
delta-BHC	1.08E-01	4.23E-11			3.02E-12		
Heptachlor	1.05E+00	4.11E-10	0.0005	8.21E-07	2.93E-11	4.5	1.32E-10
Semivolatile organics							
1,2,4-Trichlorobenzene	4.30E-01	1.68E-10	0.01	1.68E-08			
1,2-Dichlorobenzene	8.36E-01	3.27E-10	0.09	3.64E-09	2.34E-11		
1,3-Dichlorobenzene	7.68E-01	3.01E-10	0.089	3.38E-09	2.15E-11		
1,4-Dichlorobenzene	1.46E+00	5.72E-10			4.09E-11	0.024	9.81E-13
1-Chloronaphthalene	5.20E+00	2.04E-09	0.03	6.78E-08	1.45E-10		
2-Chloronaphthalene	5.85E-01	2.29E-10	0.08	2.86E-09	1.63E-11		
2-Methylnaphthalene	7.72E-01	3.02E-10	0.03	1.01E-08	2.16E-11		
4-Methylphenol	5.93E-03	2.32E-12	0.05	4.64E-11	1.66E-13		
Acenaphthene	9.11E-01	3.56E-10	0.06	5.94E-09	2.55E-11		
Acenaphthylene	6.61E-01	2.59E-10	0.03	8.62E-09	1.85E-11		
Anthracene	1.31E+00	5.11E-10	0.3	1.70E-09	3.65E-11		
Benzidine	1.19E+01	4.66E-09	0.003	1.55E-06	3.33E-10	230	7.66E-08
Benzo(a)anthracene	2.69E+00	1.05E-09			7.51E-11	0.73	5.48E-11
Benzo(a)pyrene	2.37E+00	9.27E-10			6.62E-11	7.3	4.83E-10
Benzo(b)fluoranthene	3.41E+00	1.34E-09			9.54E-11	0.73	6.96E-11
Benzo(g,h,i)perylene	1.32E+00	5.16E-10	0.03	1.72E-08	3.68E-11		
Benzo(k)fluoranthene	2.10E+00	8.22E-10			5.87E-11	0.073	4.29E-12
Benzoic acid	1.70E-01	6.65E-11	4	1.66E-11	4.75E-12		
bis(2-Ethylhexyl)phthalate	3.12E+00	1.22E-09			8.73E-11	0.014	1.22E-12
Butyl benzyl phthalate	7.81E-01	3.06E-10	0.2	1.53E-09	2.18E-11		
Chrysene	3.11E+00	1.22E-09			8.69E-11	0.0073	6.35E-13
Di-n-butyl phthalate	7.29E-01	2.85E-10	0.1	2.85E-09	2.04E-11		
Di-n-octyl phthalate	9.55E-01	3.74E-10	0.02	1.87E-08	2.67E-11		
Dibenz(a,h)anthracene	6.87E-01	2.69E-10			1.92E-11	7.3	1.40E-10
Dibenzofuran	7.96E-01	3.12E-10	0.004	7.79E-08	2.23E-11		
Dimethyl phthalate	6.13E-01	2.40E-10	10	2.40E-11	1.71E-11		
Fluoranthene	5.76E+00	2.26E-09	0.04	5.64E-08	1.61E-10		
Fluorene	7.98E-01	3.12E-10	0.04	7.81E-09	2.23E-11		
Indeno(1,2,3-cd)pyrene	1.27E+00	4.98E-10			3.56E-11	0.73	2.60E-11
Naphthalene	8.36E-01	3.27E-10	0.03	1.09E-08	2.34E-11		
Phenanthrene	4.35E+00	1.70E-09	0.03	5.67E-08	1.22E-10		
Pyrene	5.76E+00	2.25E-09	0.03	7.51E-08	1.61E-10		
Volatile Orgnics							
2-Butanone (MEK)	3.07E-02	1.20E-11	0.6	2.00E-11	8.57E-13		
Acetone	7.67E-02	3.00E-11	0.1	3.00E-10	2.14E-12		
Benzene	5.60E-03	2.19E-12			1.57E-13	0.029	4.54E-15
Carbon disulfide	8.48E-03	3.32E-12	0.1	3.32E-11	2.37E-13		
Chlorobenzene	5.84E+00	2.29E-09	0.02	1.14E-07	1.63E-10		
Ethylbenzene	1.30E-02	5.09E-12	0.1	5.09E-11	3.63E-13		
Methylene chloride	9.88E-03	3.87E-12	0.06	6.44E-11	2.76E-13	0.0075	2.07E-15
Tetrachloroethene	8.78E-03	3.44E-12	0.01	3.44E-10	2.45E-13		
Toluene	1.94E-02	7.61E-12	0.2	3.81E-11	5.44E-13		
Xylenes (total)	3.25E-02	1.27E-11	2	6.37E-12	9.10E-13		
			HAZARD INDEX =	1.18E-04	TOTAL CANCER RISK =		7.75E-08

TABLE A-20

TINKER AFB SITE - ON-BASE EAST SOLDIER CREEK (AREA 3)
INGESTION EXPOSURE TO CHEMICALS IN SEDIMENTS
ON-BASE CONSTRUCTION WORKER -RME
(FUTURE USE SCENARIO)

Equation CDI = (CS x CF x IR x EF x ED)/(BW x AT1 x AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
CDI = Chronic Daily Intake
CS = Concentration in Sediments
CF = Conversion Factor (10^{-6} kg/mg)
IR = Sediment Ingestion Rate = 50 mg/day
EF = Exposure Frequency = 5 days per year
ED = Exposure Duration = 25 years
BW = Body Weight = 70 kg
AT1 = Days Per Year = 365 days
AT2 = Average Time (70 years for cancer causing effects, 25 yearsfor effects other than carcinogenicit
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CS (mg/kg)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)-1	CANCER RISK (unitless)
Metals							
Antimony	5.97E+00	5.84E-08	0.0004	1.46E-04	2.09E-08		
Beryllium	3.72E-01	3.64E-09	0.005	7.29E-07	1.30E-09	4.3	5.59E-09
Cadmium	1.24E+02	1.21E-06	0.001	1.21E-03	4.33E-07		
Cobalt	9.70E+00	9.49E-08	0.06	1.58E-06	3.39E-08		
Lead	1.29E+02	1.26E-06			4.51E-07		
Mercury	3.45E-01	3.37E-09	0.0003	1.12E-05	1.21E-09		
Nickel	1.65E+02	1.62E-06	0.02	8.09E-05	5.78E-07		
Silver	1.06E+01	1.04E-07	0.005	2.08E-05	3.72E-08		
Vanadium	2.00E+01	1.96E-07	0.007	2.79E-05	6.98E-08		
PCBs/Pesticides							
Aldrin	2.72E-01		0.00003			17	
Aroclor 1254	1.25E+01	1.22E-07	0.00002	6.12E-03	4.37E-08		
delta-BHC	1.27E-01	1.24E-09			4.44E-10		
Heptachlor	4.50E+00	4.40E-08	0.0005	8.81E-05	1.57E-08	4.5	7.08E-08
Semivolatile organics							
1,2,4-Trichlorobenzene	4.30E-01		0.01				
1,2-Dichlorobenzene	3.63E+00	3.55E-08	0.09	3.95E-07	1.27E-08		
1,3-Dichlorobenzene	2.79E+00	2.73E-08	0.089	3.07E-07	9.75E-09		
1,4-Dichlorobenzene	5.99E+00	5.86E-08			2.09E-08	0.024	5.02E-10
1-Chloronaphthalene	5.20E+00	5.09E-08	0.03	1.70E-06	1.82E-08		
2-Chloronaphthalene	1.40E+00	1.37E-08	0.08	1.71E-07	4.89E-09		
2-Methylnaphthalene	1.20E+00	1.17E-08	0.03	3.91E-07	4.19E-09		
4-Methylphenol	6.92E-03	6.77E-11	0.05	1.35E-09	2.42E-11		
Acenaphthene	1.21E+00	1.18E-08	0.06	1.97E-07	4.22E-09		
Acenaphthylene	3.90E+00	3.82E-08	0.03	1.27E-06	1.36E-08		
Anthracene	3.05E+00	2.98E-08	0.3	9.94E-08	1.07E-08		
Benzidine	1.19E+01	1.17E-07	0.003	3.88E-05	4.16E-08	230	9.57E-06
Benzo(a)anthracene	1.43E+01	1.40E-07			5.00E-08	0.73	3.65E-08
Benzo(a)pyrene	9.96E+00	9.75E-08			3.48E-08	7.3	2.54E-07
Benzo(b)fluoranthene	1.52E+01	1.49E-07			5.30E-08	0.73	3.87E-08
Benzo(g,h,i)perylene	3.77E+00	3.69E-08	0.03	1.23E-06	1.32E-08		
Benzo(k)fluoranthene	3.68E+00	3.60E-08			1.29E-08	0.073	9.39E-10
Benzoic acid	1.70E-01	1.66E-09	4	4.16E-10	5.94E-10		
bis(2-Ethylhexyl)phthalate	6.67E+00	6.52E-08			2.33E-08	0.014	3.26E-10
Butyl benzyl phthalate	2.14E+00	2.10E-08	0.2	1.05E-07	7.48E-09		
Chrysene	9.46E+00	9.25E-08			3.31E-08	0.0073	2.41E-10
Di-n-butyl phthalate	1.88E+00	1.84E-08	0.1	1.84E-07	6.57E-09		
Di-n-octyl phthalate	1.07E+00	1.05E-08	0.02	5.24E-07	3.74E-09		
Dibenz(a,h)anthracene	1.43E+00	1.40E-08			5.01E-09	7.3	3.65E-08
Dibenzofuran	9.86E-01	9.65E-09	0.004	2.41E-06	3.45E-09		
Dimethyl phthalate	6.60E-01	6.46E-09	10	6.46E-10	2.31E-09		
Fluoranthene	1.87E+01	1.83E-07	0.04	4.58E-06	6.54E-08		
Fluorene	1.71E+00	1.67E-08	0.04	4.18E-07	5.97E-09		
Indeno(1,2,3-cd)pyrene	3.93E+00	3.85E-08			1.37E-08	0.73	1.00E-08
Naphthalene	2.49E+00	2.44E-08	0.03	8.13E-07	8.71E-09		
Phenanthrene	1.29E+01	1.27E-07	0.03	4.22E-06	4.52E-08		
Pyrene	1.78E+01	1.75E-07	0.03	5.82E-06	6.23E-08		
Volatile Orgnics							
2-Butanone (MEK)	3.07E-02	3.00E-10	0.6	5.00E-10	1.07E-10		
Acetone	9.96E-02	9.75E-10	0.1	9.75E-09	3.48E-10		
Benzene	5.60E-03	5.48E-11			1.96E-11	0.029	5.68E-13
Carbon disulfide	8.48E-03	8.30E-11	0.1	8.30E-10	2.96E-11		
Chlorobenzene	5.84E+00	5.71E-08	0.02	2.86E-06	2.04E-08		
Ethylbenzene	1.30E-02	1.27E-10	0.1	1.27E-09	4.54E-11		
Methylene chloride	9.88E-03	9.67E-11	0.06	1.61E-09	3.45E-11	0.0075	2.59E-13
Tetrachloroethene	8.78E-03	8.59E-11	0.01	8.59E-09	3.07E-11		
Toluene	2.13E-02	2.08E-10	0.2	1.04E-09	7.44E-11		
Xylenes (total)	3.25E-02	3.18E-10	2	1.59E-10	1.14E-10		
			HAZARD INDEX =	7.78E-03	TOTAL CANCER RISK =		1.00E-05

TABLE A-21

TINKER AFB SITE - ON-BASE WEST SOLDIER CREEK (AREA 1)
INGESTION EXPOSURE TO CHEMICALS IN SEDIMENTS
ON-BASE CONSTRUCTION WORKER -AVERAGE EXPOSURE
(CURRENT USE SCENARIO)

Equation : CDI = (CS x CF x IR x EF x ED)/(BW x AT1 x AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
CDI = Chronic Daily Intake
CS = Concentration in Sediments
CF = Conversion Factor (10^{-6} kg/mg)
IR = Sediment Ingestion Rate = 10 mg/day
EF = Exposure Frequency = 1 day per year
ED = Exposure Duration = 5 years
BW = Body Weight = 70 kg
AT1 = Days Per Year = 365 days
AT2 = Average Time (70 years for cancer causing effects, 5 yearsfor effects other than carcinogenicity)
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CS (mg/kg)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)-1	CANCER RISK (unitless)
Metals							
Antimony	4.60E+00	1.80E-09	0.0004	4.50E-06	1.28E-10		
Beryllium	9.76E-01	3.82E-10	0.005	7.64E-08	2.73E-11	4.3	1.17E-10
Cadmium	1.28E+01	5.01E-09	0.001	5.01E-06	3.58E-10		
Chromium	2.68E+02	1.05E-07	1	1.05E-07	7.48E-09		
Cobalt	2.17E+01	8.49E-09	0.06	1.41E-07	6.06E-10		
Lead	7.03E+01	2.75E-08			1.97E-09		
Mercury	1.43E-01	5.59E-11	0.0003	1.86E-07	3.99E-12		
Nickel	4.08E+02	1.60E-07	0.02	7.99E-06	1.14E-08		
Silver	2.08E+01	8.16E-09	0.005	1.63E-06	5.83E-10		
Thallium	3.86E-01	1.51E-10	0.00008	1.89E-06	1.08E-11		
Vanadium	3.36E+01	1.31E-08	0.007	1.88E-06	9.39E-10		
PCBs/Pesticides							
Aldrin	1.59E-02	6.20E-12	0.00003	2.07E-07	4.43E-13	17	7.53E-12
Aroclor 1254	1.98E+00	7.75E-10	0.00002	3.88E-05	5.54E-11		
Semivolatile organics							
1,2-Dichlorobenzene	6.05E-01	2.37E-10	0.09	2.63E-09	1.69E-11		
1,4-Dichlorobenzene	5.92E-01	2.32E-10			1.65E-11	0.024	3.97E-13
2,4-Dimethylphenol	5.79E-01	2.27E-10	0.02	1.13E-08	1.62E-11		
2-Methylnaphthalene	5.89E-01	2.31E-10	0.03	7.68E-09	1.65E-11		
3/4-Methylphenol	5.77E-01	2.26E-10	0.05	4.52E-09	1.61E-11		
Acenaphthene	5.98E-01	2.34E-10	0.06	3.90E-09	1.67E-11		
Anthracene	5.94E-01	2.32E-10	0.3	7.75E-10	1.66E-11		
Benzidine	4.54E+00	1.78E-09	0.003	5.93E-07	1.27E-10	230	2.92E-08
Benzo(a)anthracene	7.10E-01	2.78E-10			1.98E-11	0.73	1.45E-11
Benzo(a)pyrene	6.48E-01	2.53E-10			1.81E-11	7.3	1.32E-10
Benzo(b)fluoranthene	8.89E-01	3.48E-10			2.48E-11	0.73	1.81E-11
Benzo(g,h,i)perylene	4.48E-01	1.75E-10	0.03	5.84E-09	1.25E-11		
Benzo(k)fluoranthene	7.99E-01	3.13E-10			2.23E-11	0.073	1.63E-12
bis(2-Ethylhexyl)phthalate	1.15E+00	4.49E-10			3.21E-11	0.014	4.49E-13
Butyl benzyl phthalate	5.95E-01	2.33E-10	0.2	1.16E-09	1.66E-11		
Chrysene	7.07E-01	2.77E-10			1.98E-11	0.0073	1.44E-13
Di-n-butyl phthalate	5.96E-01	2.33E-10	0.1	2.33E-09	1.67E-11		
Dibenz[a,h]anthracene	5.96E-01	2.33E-10			1.67E-11	7.3	1.22E-10
Dibenzofuran	5.95E-01	2.33E-10	0.004	5.82E-08	1.66E-11		
Dimethyl phthalate	5.81E-01	2.28E-10	10	2.28E-11	1.63E-11		
Fluoranthene	1.09E+00	4.25E-10	0.04	1.06E-08	3.04E-11		
Fluorene	5.98E-01	2.34E-10	0.04	5.85E-09	1.67E-11		
Indeno(1,2,3-cd)pyrene	5.54E-01	2.17E-10			1.55E-11	0.73	1.13E-11
Naphthalene	6.01E-01	2.35E-10	0.03	7.84E-09	1.68E-11		
Phenanthrene	1.05E+00	4.11E-10	0.03	1.37E-08	2.94E-11		
Pyrene	1.01E+00	3.94E-10	0.03	1.31E-08	2.81E-11		
Volatile Oragnics							
2-Butanone (MEK)	8.84E-03	3.46E-12	0.6	5.77E-12	2.47E-13		
Acetone	2.20E-02	8.60E-12	0.1	8.60E-11	6.15E-13		
Carbon disulfide	3.97E-03	1.55E-12	0.1	1.55E-11	1.11E-13		
Chlorobenzene	4.20E-03	1.64E-12	0.02	8.22E-11	1.17E-13		
Chloromethane	8.48E-03	3.32E-12			2.37E-13	0.013	3.08E-15
Methylene chloride	4.29E-03	1.68E-12	0.06	2.80E-11	1.20E-13	0.0075	8.99E-16
Tetrachloroethene	4.38E-03	1.71E-12	0.01	1.71E-10	1.22E-13		
Toluene	4.46E-03	1.75E-12	0.2	8.73E-12	1.25E-13		
Trichloroethene	4.70E-03	1.84E-12	0.006	3.06E-10	1.31E-13	0.011	1.44E-15
Vinyl chloride	8.48E-03	3.32E-12			2.37E-13	1.9	4.50E-13
				HAZARD INDEX =	6.31E-05	TOTAL CANCER RISK =	2.96E-08

TABLE A-22

TINKER AFB SITE - ON-BASE WEST SOLDIER CREEK (AREA 1)
INGESTION EXPOSURE TO CHEMICALS IN SEDIMENTS
ON-BASE CONSTRUCTION WORKER -RME
(CURRENT USE SCENARIO)

Equation : CDI = (CS x CF x IR x EF x ED)/(BW x AT1 x AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
CDI = Chronic Daily Intake
CS = Concentration in Sediments
CF = Conversion Factor (10^{-6} kg/mg)
IR = Sediment Ingestion Rate = 50 mg/day
EF = Exposure Frequency = 5 days per year
ED = Exposure Duration = 25 years
BW = Body Weight = 70 kg
AT1 = Days Per Year = 365 days
AT2 = Average Time (70 years for cancer causing effects, 25 yearsfor effects other than carcinogenicity)
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CS (mg/kg)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)-1	CANCER RISK (unitless)
Metals							
Antimony	5.17E+00	5.06E-08	0.0004	1.27E-04	1.81E-08		
Beryllium	1.20E+00	1.17E-08	0.005	2.34E-06	4.18E-09	4.3	1.80E-08
Cadmium	6.19E+01	6.05E-07	0.001	6.05E-04	2.16E-07		
Chromium	6.68E+02	6.54E-06	1	6.54E-06	2.33E-06		
Cobalt	3.02E+01	2.96E-07	0.06	4.93E-06	1.06E-07		
Lead	1.21E+02	1.19E-06			4.24E-07		
Mercury	1.92E-01	1.88E-09	0.0003	6.25E-06	6.70E-10		
Nickel	1.20E+03	1.18E-05	0.02	5.88E-04	4.20E-06		
Silver	1.02E+02	9.95E-07	0.005	1.99E-04	3.55E-07		
Thallium	5.01E-01	4.90E-09	0.00008	6.13E-05	1.75E-09		
Vanadium	3.90E+01	3.81E-07	0.007	5.45E-05	1.36E-07		
PCBs/Pesticides							
Aldrin	3.38E-02	3.30E-10	0.00003	1.10E-05	1.18E-10	17	2.01E-09
Aroclor 1254	2.40E+01	2.35E-07	0.00002	1.17E-02	8.39E-08		
Semivolatile organics							
1,2-Dichlorobenzene	7.57E-01	7.40E-09	0.09	8.23E-08	2.64E-09		
1,4-Dichlorobenzene	7.93E-01	7.76E-09			2.77E-09	0.024	6.65E-11
2,4-Dimethylphenol	8.54E-01	8.35E-09	0.02	4.18E-07	2.98E-09		
2-Methylnaphthalene	7.80E-01	7.63E-09	0.03	2.54E-07	2.73E-09		
3/4-Methylphenol	8.29E-01	8.11E-09	0.05	1.62E-07	2.90E-09		
Acenaphthene	9.07E-01	8.88E-09	0.06	1.48E-07	3.17E-09		
Anthracene	8.22E-01	8.04E-09	0.3	2.68E-08	2.87E-09		
Benzidine	5.65E+00	5.53E-08	0.003	1.84E-05	1.97E-08	230	4.54E-06
Benzo(a)anthracene	1.32E+00	1.29E-08			4.62E-09	0.73	3.37E-09
Benzo(a)pyrene	1.16E+00	1.13E-08			4.04E-09	7.3	2.95E-08
Benzo(b)fluoranthene	3.00E+00	2.94E-08			1.05E-08	0.73	7.65E-09
Benzo(g,h,i)perylene	7.11E-01	6.96E-09	0.03	2.32E-07	2.48E-09		
Benzo(k)fluoranthene	1.52E+00	1.49E-08			5.31E-09	0.073	3.88E-10
bis(2-Ethylhexyl)phthalate	2.10E+00	2.06E-08			7.35E-09	0.014	1.03E-10
Butyl benzyl phthalate	7.42E-01	7.26E-09	0.2	3.63E-08	2.59E-09		
Chrysene	1.77E+00	1.73E-08			6.19E-09	0.0073	4.52E-11
Di-n-butyl phthalate	7.50E-01	7.34E-09	0.1	7.34E-08	2.62E-09		
Dibenz(a,h)anthracene	8.04E-01	7.86E-09			2.81E-09	7.3	2.05E-08
Dibenzofuran	8.11E-01	7.93E-09	0.004	1.98E-06	2.83E-09		
Dimethyl phthalate	8.63E-01	8.45E-09	10	8.45E-10	3.02E-09		
Fluoranthene	3.37E+00	3.30E-08	0.04	8.25E-07	1.18E-08		
Fluorene	8.11E-01	7.93E-09	0.04	1.98E-07	2.83E-09		
Indeno(1,2,3-cd)pyrene	1.02E+00	1.00E-08			3.58E-09	0.73	2.61E-09
Naphthalene	8.05E-01	7.88E-09	0.03	2.63E-07	2.81E-09		
Phenanthrene	2.59E+00	2.53E-08	0.03	8.44E-07	9.04E-09		
Pyrene	3.08E+00	3.01E-08	0.03	1.00E-06	1.08E-08		
Volatile Oragnics							
2-Butanone (MEK)	1.06E-02	1.04E-10	0.6	1.73E-10	3.70E-11		
Acetone	3.93E-02	3.85E-10	0.1	3.85E-09	1.37E-10		
Carbon disulfide	4.54E-03	4.44E-11	0.1	4.44E-10	1.59E-11		
Chlorobenzene	4.88E-03	4.78E-11	0.02	2.39E-09	1.71E-11		
Chloromethane	9.87E-03	9.66E-11			3.45E-11	0.013	4.49E-13
Methylene chlonde	5.51E-03	5.40E-11	0.06	8.99E-10	1.93E-11	0.0075	1.45E-13
Tetrachloroethene	5.15E-03	5.04E-11	0.01	5.04E-09	1.80E-11		
Toluene	5.48E-03	5.37E-11	0.2	2.68E-10	1.92E-11		
Trichloroethene	5.67E-03	5.54E-11	0.006	9.24E-09	1.98E-11	0.011	2.18E-13
Vinyl chlonde	9.87E-03	9.66E-11			3.45E-11	1.9	6.56E-11
			HAZARD INDEX =	1.34E-02	TOTAL CANCER RISK =		4.62E-06

TABLE A-23

TINKER AFB SITE - ON-BASE EAST SOLDIER CREEK (AREA 3)
INGESTION EXPOSURE TO CHEMICALS IN SEDIMENTS
ON-BASE CONSTRUCTION WORKER -AVERAGE EXPOSURE
(CURRENT USE SCENARIO)

Equation CDI = (CS x CF x IR x EF x ED)/(BW x AT1 x AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
CDI = Chronic Daily Intake
CS = Concentration in Sediments
CF = Conversion Factor (10^{-6} kg/mg)
IR = Sediment Ingestion Rate = 10 mg/day
EF = Exposure Frequency = 1 day per year
ED = Exposure Duration = 5 years
BW = Body Weight = 70 kg
AT1 = Days Per Year = 365 days
AT2 = Average Time (70 years for cancer causing effects, 5 yearsfor effects other than carcinogenicity)
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CS (mg/kg)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)-1	CANCER RISK (unitless)
Metals							
Antimony	5.56E+00	2.18E-09	0.0004	5.44E-06	1.55E-10		
Beryllium	3.05E-01	1.19E-10	0.005	2.39E-08	8.52E-12	4.3	3.67E-11
Cadmium	3.38E+01	1.32E-08	0.001	1.32E-05	9.46E-10		
Cobalt	7.25E+00	2.84E-09	0.06	4.73E-08	2.03E-10		
Lead	8.92E+01	3.49E-08			2.49E-09		
Mercury	2.53E-01	9.92E-11	0.0003	3.31E-07	7.08E-12		
Nickel	1.04E+02	4.08E-08	0.02	2.04E-06	2.91E-09		
Silver	4.94E+00	1.93E-09	0.005	3.87E-07	1.38E-10		
Vanadium	1.79E+01	6.99E-09	0.007	9.99E-07	5.00E-10		
PCBs/Pesticides							
Aldrin	1.49E-01	5.81E-11	0.00003	1.94E-06		17	
Aroclor 1254	6.31E+00	2.47E-09	0.00002	1.23E-04	1.76E-10		
delta-BHC	1.38E-01	5.40E-11			3.86E-12		
Heptachlor	2.53E+00	9.90E-10	0.0005	1.98E-06	7.07E-11	4.5	3.18E-10
Semivolatile organics							
1,2,4-Trichlorobenzene	7.84E-01	3.07E-10	0.01	3.07E-08			
1,2-Dichlorobenzene	7.89E-01	3.09E-10	0.09	3.43E-09	2.21E-11		
1,3-Dichlorobenzene	7.85E-01	3.07E-10	0.089	3.45E-09	2.19E-11		
1,4-Dichlorobenzene	7.84E-01	3.07E-10			2.19E-11	0.024	5.26E-13
1-Chloronaphthalene	6.27E+00	2.45E-09	0.03	8.17E-08	1.75E-10		
2-Chloronaphthalene	7.49E-01	2.93E-10	0.08	3.67E-09	2.09E-11		
2-Methylnaphthalene	7.32E-01	2.86E-10	0.03	9.55E-09	2.05E-11		
4-Methylphenol	9.67E-03	3.78E-12	0.05	7.57E-11	2.70E-13		
Acenaphthene	9.72E-01	3.80E-10	0.06	6.34E-09	2.72E-11		
Acenaphthylene	9.11E-01	3.57E-10	0.03	1.19E-08	2.55E-11		
Anthracene	1.79E+00	7.01E-10	0.3	2.34E-09	5.01E-11		
Benzidine	1.57E+01	6.13E-09	0.003	2.04E-06	4.38E-10	230	1.01E-07
Benzo(a)anthracene	3.71E+00	1.45E-09			1.04E-10	0.73	7.56E-11
Benzo(a)pyrene	3.10E+00	1.21E-09			8.66E-11	7.3	6.32E-10
Benzo(b)fluoranthene	3.89E+00	1.52E-09			1.09E-10	0.73	7.95E-11
Benzo(g,h,i)perylene	1.81E+00	7.09E-10	0.03	2.36E-08	5.07E-11		
Benzo(k)fluoranthene	3.40E+00	1.33E-09			9.49E-11	0.073	6.93E-12
Benzoic acid	6.23E+00	2.44E-09	4	6.10E-10	1.74E-10		
bis(2-Ethylhexyl)phthalate	2.84E+00	1.11E-09			7.94E-11	0.014	1.11E-12
Butyl benzyl phthalate	9.68E-01	3.79E-10	0.2	1.89E-09	2.71E-11		
Chrysene	4.18E+00	1.64E-09			1.17E-10	0.0073	8.53E-13
Di-n-butyl phthalate	7.99E-01	3.13E-10	0.1	3.13E-09	2.23E-11		
Di-n-octyl phthalate	7.78E-01	3.04E-10	0.02	1.52E-08	2.17E-11		
Dibenz(a,h)anthracene	8.57E-01	3.35E-10			2.40E-11	7.3	1.75E-10
Dibenzofuran	8.21E-01	3.21E-10	0.004	8.04E-08	2.30E-11		
Dimethyl phthalate	6.70E-01	2.62E-10	10	2.62E-11	1.87E-11		
Fluoranthene	7.22E+00	2.82E-09	0.04	7.06E-08	2.02E-10		
Fluorene	9.94E-01	3.89E-10	0.04	9.73E-09	2.78E-11		
Indeno(1,2,3-cd)pyrene	1.70E+00	6.64E-10			4.74E-11	0.73	3.46E-11
Naphthalene	9.40E-01	3.68E-10	0.03	1.23E-08	2.63E-11		
Phenanthrene	5.65E+00	2.21E-09	0.03	7.37E-08	1.58E-10		
Pyrene	7.08E+00	2.77E-09	0.03	9.24E-08	1.98E-10		
Volatile Organics							
2-Butanone (MEK)	3.81E-02	1.49E-11	0.6	2.48E-11	1.06E-12		
Acetone	7.39E-02	2.89E-11	0.1	2.89E-10	2.07E-12		
Benzene	1.28E-02	5.03E-12			3.59E-13	0.029	1.04E-14
Carbon disulfide	9.98E-03	3.90E-12	0.1	3.90E-11	2.79E-13		
Chlorobenzene	1.22E-01	4.79E-11	0.02	2.40E-09	3.42E-12		
Ethylbenzene	1.37E-02	5.36E-12	0.1	5.36E-11	3.83E-13		
Methylene chloride	1.08E-02	4.24E-12	0.06	7.07E-11	3.03E-13	0.0075	2.27E-15
Tetrachloroethene	1.15E-02	4.51E-12	0.01	4.51E-10	3.22E-13		
Toluene	1.58E-02	6.18E-12	0.2	3.09E-11	4.42E-13		
Xylenes (total)	1.25E-02	4.89E-12	2	2.44E-12	3.49E-13		
			HAZARD INDEX =	1.52E-04	TOTAL CANCER RISK =		1.02E-07

TABLE A-24

TINKER AFB SITE - ON-BASE EAST SOLDIER CREEK (AREA 3)
INGESTION EXPOSURE TO CHEMICALS IN SEDIMENTS
ON-BASE CONSTRUCTION WORKER -RME
(CURRENT USE SCENARIO)

Equation CDI = (CS x CF x IR x EF x ED)/(BW x AT1 x AT2)
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
CDI = Chronic Daily Intake
CS = Concentration in Sediments
CF = Conversion Factor (10^{-6} kg/mg)
IR = Sediment Ingestion Rate = 50 mg/day
EF = Exposure Frequency = 5 days per year
ED = Exposure Duration = 25 years
BW = Body Weight = 70 kg
AT1 = Days Per Year = 365 days
AT2 = Average Time (70 years for cancer causing effects, 25 yearsfor effects other than carcinogenicit
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CS (mg/kg)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)-1	CANCER RISK (unitless)
Metals							
Antimony	6.18E+00	6.05E-08	0.0004	1.51E-04	2.16E-08		
Beryllium	3.98E-01	3.90E-09	0.005	7.79E-07	1.39E-09	4.3	5.98E-09
Cadmium	9.97E+01	9.76E-07	0.001	9.76E-04	3.48E-07		
Cobalt	1.13E+01	1.11E-07	0.06	1.85E-06	3.97E-08		
Lead	1.68E+02	1.64E-06			5.87E-07		
Mercury	3.52E-01	3.44E-09	0.0003	1.15E-05	1.23E-09		
Nickel	2.38E+02	2.33E-06	0.02	1.16E-04	8.31E-07		
Silver	7.72E+00	7.56E-08	0.005	1.51E-05	2.70E-08		
Vanadium	2.33E+01	2.28E-07	0.007	3.26E-05	8.14E-08		
PCBs/Pesticides							
Aldrin	6.81E-01		0.00003			17	
Aroclor 1254	3.27E+01	3.20E-07	0.00002	1.60E-02	1.14E-07		
delta-BHC	3.45E-01	3.38E-09			1.21E-09		
Heptachlor	2.20E+01	2.15E-07	0.0005	4.31E-04	7.69E-08	4.5	3.46E-07
Semivolatile organics							
1,2,4-Trichlorobenzene	3.19E+00		0.01				
1,2-Dichlorobenzene	3.23E+00	3.16E-08	0.09	3.51E-07	1.13E-08		
1,3-Dichlorobenzene	2.65E+00	2.59E-08	0.089	2.91E-07	9.26E-09		
1,4-Dichlorobenzene	3.40E+00	3.33E-08			1.19E-08	0.024	2.85E-10
1-Chloronaphthalene	1.24E+01	1.21E-07	0.03	4.05E-06	4.34E-08		
2-Chloronaphthalene	1.91E+00	1.87E-08	0.08	2.34E-07	6.69E-09		
2-Methylnaphthalene	1.01E+00	9.89E-09	0.03	3.30E-07	3.53E-09		
4-Methylphenol	1.90E-02	1.86E-10	0.05	3.72E-09	6.64E-11		
Acenaphthene	1.56E+00	1.52E-08	0.06	2.54E-07	5.44E-09		
Acenaphthylene	4.12E+00	4.03E-08	0.03	1.34E-06	1.44E-08		
Anthracene	3.88E+00	3.80E-08	0.3	1.27E-07	1.36E-08		
Benzidine	1.88E+01	1.84E-07	0.003	6.14E-05	6.57E-08	230	1.51E-05
Benzo(a)anthracene	1.46E+01	1.43E-07			5.10E-08	0.73	3.72E-08
Benzo(a)pyrene	8.99E+00	8.80E-08			3.14E-08	7.3	2.29E-07
Benzo(b)fluoranthene	1.00E+01	9.79E-08			3.49E-08	0.73	2.55E-08
Benzo(g,h,i)perylene	3.62E+00	3.54E-08	0.03	1.18E-06	1.27E-08		
Benzo(k)fluoranthene	6.36E+00	6.23E-08			2.22E-08	0.073	1.62E-09
Benzoic acid	3.14E+01	3.08E-07	4	7.69E-08	1.10E-07		
bis(2-Ethylhexyl)phthalate	6.36E+00	6.22E-08			2.22E-08	0.014	3.11E-10
Butyl benzyl phthalate	2.48E+00	2.42E-08	0.2	1.21E-07	8.65E-09		
Chrysene	1.25E+01	1.23E-07			4.39E-08	0.0073	3.20E-10
Di-n-butyl phthalate	1.42E+00	1.39E-08	0.1	1.39E-07	4.96E-09		
Di-n-octyl phthalate	1.08E+00	1.05E-08	0.02	5.27E-07	3.76E-09		
Dibenz(a,h)anthracene	1.88E+00	1.84E-08			6.56E-09	7.3	4.79E-08
Dibenzofuran	1.32E+00	1.29E-08	0.004	3.23E-06	4.61E-09		
Dimethyl phthalate	1.93E+00	1.89E-08	10	1.89E-09	6.75E-09		
Fluoranthene	2.62E+01	2.56E-07	0.04	6.40E-06	9.15E-08		
Fluorene	1.86E+00	1.82E-08	0.04	4.54E-07	6.49E-09		
Indeno(1,2,3-cd)pyrene	3.25E+00	3.18E-08			1.14E-08	0.73	8.30E-09
Naphthalene	2.39E+00	2.33E-08	0.03	7.78E-07	8.34E-09		
Phenanthrene	2.39E+01	2.34E-07	0.03	7.80E-06	8.35E-08		
Pyrene	2.40E+01	2.35E-07	0.03	7.83E-06	8.39E-08		
Volatile Oragnics							
2-Butanone (MEK)	3.81E-02	3.73E-10	0.6	6.21E-10	1.33E-10		
Acetone	1.16E-01	1.14E-09	0.1	1.14E-08	4.06E-10		
Benzene	1.28E-02	1.26E-10			4.49E-11	0.029	1.30E-12
Carbon disulfide	9.98E-03	9.76E-11	0.1	9.76E-10	3.49E-11		
Chlorobenzene	1.22E-01	1.20E-09	0.02	5.99E-08	4.28E-10		
Ethylbenzene	1.37E-02	1.34E-10	0.1	1.34E-09	4.78E-11		
Methylene chloride	1.08E-02	1.06E-10	0.06	1.77E-09	3.79E-11	0.0075	2.84E-13
Tetrachloroethene	1.15E-02	1.13E-10	0.01	1.13E-08	4.03E-11		
Toluene	1.58E-02	1.55E-10	0.2	7.73E-10	5.52E-11		
Xylenes (total)	1.25E-02	1.22E-10	2	6.11E-11	4.37E-11		
			HAZARD INDEX =	1.78E-02	TOTAL CANCER RISK =		1.58E-05

TABLE A-25

TINKER AFB SITE - OFF-BASE WEST SOLDIER CREEK (AREA 2)
INCIDENTAL INGESTION OF CHEMICALS IN SURFACE WATER DUE TO WADING
OFF-BASE CHILD AND ADULT RESIDENT -AVERAGE EXPOSURE
(CURRENT AND FUTURE USE SCENARIO)

Equation : **HIF = [(IRc x ETc x EFc x EDc) / BWc + (IRa x ETa x EFa x EDa) / BWa] / (AT1 x AT2)**
CDI = CW x HIF
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
HIF = Human Intake Factor
CDI = Chronic Daily Intake
CW = Concentration in Surface Water
IRc = Child Ingestion Rate = 0.0025 L/hour
ETc = Child Exposure Time = 3 hours/day
EFc = Child Exposure Frequency = 17 days per year
EDc = Child Exposure Duration = 5 years
BWc = Child Body Weight = 15.1 kg
IRa = Adult Ingestion Rate = 0.0025 L/hour
ETa = Adult Exposure Time = 1 hour /day
EFa = Adult Exposure Frequency = 2 days per year
EDa = Adult Exposure Duration = 9 years
BW = Adult Body Weight = 57.1 kg
AT1 = Days Per Year = 365 days/year
AT2 = Averaging Time (70 years for carcinogenic effects, 14 years for non-carcinogenic effects)
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CW (mg/L)	NON-CANCER HIF (L/kg-dy)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER HIF (L/kg-dy)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)[1]	CANCER RISK (unitless)
Metals									
Arsenic	1.80E-03	8.42E-06	1.51E-08	0.0003	5.05E-05	1.68E-06	3.03E-09	1.5	4.54E-09
Thallium	1.10E-03	8.42E-06	1.70E-10	0.00008	2.12E-06	1.68E-06	1.85E-09		
Vanadium	9.24E-03	8.42E-06	1.42E-09	0.007	2.04E-07	1.68E-06	1.55E-08		
Volatile Organics									
Carbon disulfide	1.00E-03	8.42E-06	1.54E-10	0.1	1.54E-09	1.68E-06	1.68E-09		
Methylene chloride	2.26E-03	8.42E-06	3.49E-10	0.06	5.82E-09	1.68E-06	3.81E-09	0.0075	2.86E-11
				HAZARD INDEX =	5.28E-05			TOTAL CANCER RISK =	4.57E-09

TABLE A-26

TINKER AFB SITE - OFF-BASE WEST SOLDIER CREEK (AREA 2)
INCIDENTAL INGESTION OF CHEMICALS IN SURFACE WATER DUE TO WADING
OFF-BASE CHILD AND ADULT RESIDENT - RME
(CURRENT AND FUTURE USE SCENARIO)

Equation : **HIF = [(IRc x ETc x EFc x EDc) / BWc + (IRa x ETa x EFa x EDa) / BWa] / (AT1 x AT2)**
CDI = CW x HIF
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
HIF = Human Intake Factor
CDI = Chronic Daily Intake
CW = Concentration in Surface Water
IRc = Child Ingestion Rate = 0.005 L/hour
ETc = Child Exposure Time = 6 hours/day
EFc = Child Exposure Frequency = 34 days per year
EDc = Child Exposure Duration = 5 years
BWc = Child Body Weight = 15.1 kg
IRa = Adult Ingestion Rate = 0.005 L/hour
ETa = Adult Exposure Time = 2 hour /day
EFa = Adult Exposure Frequency = 4 days per year
EDa = Adult Exposure Duration = 25 years
BW = Adult Body Weight = 57.1 kg
AT1 = Days Per Year = 365 days/year
AT2 = Averaging Time (70 years for carcinogenic effects, 30 years for non-carcinogenic effects)
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CW (mg/L)	NON-CANCER HIF (L/kg-dy)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER HIF (L/kg-dy)	CANCER CDI (mg/kg-dy)	SF $(mg/kg\text{-}dy)^{-1}$	CANCER RISK (unitless)
Metals									
Arsenic	1.80E-03	3.24E-05	5.84E-08	0.0003	1.95E-04	1.39E-05	2.50E-08	1.5	3.75E-08
Thallium	1.10E-03	3.24E-05	1.76E-09	0.00008	2.20E-05	1.39E-05	1.53E-08		
Vanadium	1.37E-02	3.24E-05	2.18E-08	0.007	3.12E-06	1.39E-05	1.90E-07		
Volatile Organics									
Carbon disulfide	1.00E-03	3.24E-05	1.60E-09	0.1	1.60E-08	1.39E-05	1.39E-08		
Methylene chloride	2.70E-03	3.24E-05	4.32E-09	0.06	7.20E-08	1.39E-05	3.75E-08	0.0075	2.82E-10
					HAZARD INDEX =	2.20E-04			TOTAL CANCER RISK = 3.78E-08

TABLE A-27

TINKER AFB SITE - OFF-BASE EAST SOLDIER CREEK (AREA 4)
INCIDENTAL INGESTION OF CHEMICALS IN SURFACE WATER DUE TO WADING AND SWIMMING
OFF-BASE CHILD AND ADULT RESIDENT - AVERAGE EXPOSURE
(CURRENT AND FUTURE USE SCENARIO)

Equation : HIF = [(IRc x ETc x EFc x EDc) / BWc + (IRa x ETa x EFa x EDa) / BWa] / (AT1 x AT2)
CDI = CW x HIF
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
HIF = Human Intake Factor
CDI = Chronic Daily Intake
CW = Concentration in Surface Water
IRc = Child Ingestion Rate = 0.025 L/hour
ETc = Child Exposure Time = 3 hours/day
EFc = Child Exposure Frequency = 17 days per year
EDc = Child Exposure Duration = 5 years
BWc = Child Body Weight = 15.1 kg
IRa = Adult Ingestion Rate = 0.0025 L/hour
ETa = Adult Exposure Time = 1 hour /day
EFa = Adult Exposure Frequency = 2 days per year
EDa = Adult Exposure Duration = 9 years
BW = Adult Body Weight = 57.1 kg
AT1 = Days Per Year = 365 days/year
AT2 = Averaging Time (70 years for carcinogenic effects, 14 years for non-carcinogenic effects)
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CW (mg/L)	NON-CANCER HIF (L/kg-dy)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER HIF (L/kg-dy)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)$^{-1}$	CANCER RISK (unitless)
Metals									
Arsenic	1.40E-03	8.28E-05	1.16E-07	0.0003	3.86E-04	1.66E-05	2.32E-08	1.5	3.48E-08
Cadmium	2.64E-03	8.28E-05	2.18E-07	0.0005	4.37E-04	1.66E-05	4.37E-08		
Cobalt	5.23E-03	8.28E-05	4.32E-07	0.06	7.21E-06	1.66E-05	8.65E-08		
Nickel	2.99E-02	8.28E-05	2.48E-06	0.02	1.24E-04	1.66E-05	4.96E-07		
Thallium	1.20E-03	8.28E-05	9.93E-08	0.00008	1.24E-03	1.66E-05	1.99E-08		
Vanadium	6.66E-03	8.28E-05	5.51E-07	0.007	7.88E-05	1.66E-05	1.10E-07		
Chlorinated Pesticides									
Aldrin	5.36E-05	8.28E-05	4.43E-09	0.00003	1.48E-04	1.66E-05	8.87E-10	17	1.51E-08
Semivolatile Organics									
bis(2-Ethylhexyl)phthalate	3.60E-03	8.28E-05	2.98E-07	0.02	1.49E-05	1.66E-05	5.96E-08	0.014	8.34E-10
Phenol	1.20E-03	8.28E-05	9.93E-08	7	1.42E-08	1.66E-05	1.99E-08		
Volatile Organics									
Acetone	5.30E-03	8.28E-05	4.39E-07	0.1	4.39E-06	1.66E-05	8.77E-08		
Methylene chloride	1.25E-02	8.28E-05	1.03E-06	0.06	1.72E-05	1.66E-05	2.06E-07	0.0075	1.55E-09
				HAZARD INDEX =	2.46E-03			TOTAL CANCER RISK =	5.22E-08

TABLE A-28

TINKER AFB SITE - OFF-BASE EAST SOLDIER CREEK (AREA 4)
INCIDENTAL INGESTION OF CHEMICALS IN SURFACE WATER DUE TO WADING AND SWIMMING
OFF-BASE CHILD AND ADULT RESIDENT - RME
(CURRENT AND FUTURE USE SCENARIO)

Equation : HIF = [(IRc x ETc x EFc x EDc) / BWc + (IRa x ETa x EFa x EDa) / BWa] / (AT1 x AT2)
CDI = CW x HIF
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
- HIF = Human Intake Factor
- CDI = Chronic Daily Intake
- CW = Concentration in Surface Water
- IRc = Child Ingestion Rate = 0.05 L/hour
- ETc = Child Exposure Time = 6 hours/day
- EFc = Child Exposure Frequency = 34 days per year
- EDc = Child Exposure Duration = 5 years
- BWc = Child Body Weight = 15.1 kg
- IRa = Adult Ingestion Rate = 0.005 L/hour
- ETa = Adult Exposure Time = 2 hour /day
- EFa = Adult Exposure Frequency = 4 days per year
- EDa = Adult Exposure Duration = 25 years
- BW = Adult Body Weight = 57.1 kg
- AT1 = Days Per Year = 365 days/year
- AT2 = Averaging Time (70 years for carcinogenic effects, 30 years for non-carcinogenic effects)
- SF = Slope Factor
- RfD = Reference Dose

CHEMICALS OF CONCERN	CW (mg/L)	NON-CANCER HIF (L/kg-dy)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER HIF (L/kg-dy)	CANCER CDI (mg/kg-dy)	SF $(mg/kg\text{-}dy)^{-1}$	CANCER RISK (unitless)
Metals									
Arsenic	1.40E-03	3.10E-04	4.34E-07	0.0003	1.45E-03	1.33E-04	1.86E-07	1.5	2.79E-07
Cadmium	2.64E-03	3.10E-04	8.18E-07	0.0005	1.64E-03	1.33E-04	3.50E-07		
Cobalt	5.23E-03	3.10E-04	1.62E-06	0.06	2.70E-05	1.33E-04	6.94E-07		
Nickel	2.99E-02	3.10E-04	9.28E-06	0.02	4.64E-04	1.33E-04	3.98E-06		
Thallium	1.20E-03	3.10E-04	3.72E-07	0.00008	4.65E-03	1.33E-04	1.59E-07		
Vanadium	6.66E-03	3.10E-04	2.07E-06	0.007	2.95E-04	1.33E-04	8.85E-07		
Chlorinated Pesticides									
Aldrin	5.36E-05	3.10E-04	1.66E-08	0.00003	5.53E-04	1.33E-04	7.12E-09	17	1.21E-07
Semivolatile Organics									
bis(2-Ethylhexyl)phthalate	3.60E-03	3.10E-04	1.12E-06	0.02	5.58E-05	1.33E-04	4.78E-07	0.014	6.70E-09
Phenol	1.20E-03	3.10E-04	3.72E-07	?	5.32E-08	1.33E-04	1.59E-07		
Volatile Organics									
Acetone	5.30E-03	3.10E-04	1.64E-06	0.1	1.64E-05	1.33E-04	7.04E-07		
Methylene chloride	1.25E-02	3.10E-04	3.86E-06	0.06	6.44E-05	1.33E-04	1.66E-06	0.0075	1.24E-08
				HAZARD INDEX =	9.21E-03			TOTAL CANCER RISK =	4.19E-07

TABLE A-29

TINKER AFB SITE - OFF-BASE WEST SOLDIER CREEK (AREA 2)
DERMAL EXPOSURE TO CHEMICALS IN SURFACE WATER DUE TO WADING
OFF-BASE CHILD AND ADULT RESIDENT - AVERAGE EXPOSURE
(CURRENT AND FUTURE USE SCENARIO)

Equation : HIF ={ [(SAc x ETc x EFc x EDc) / BWc + (SAa x ETa x EFa x EDa) / BWa] / (AT1 x AT2)} x CF
CDI = CW x PC x HIF
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:

HIF = Human Intake Factor
CDI = Chronic Daily Intake
CW = Concentration in Surface Water
PC = Chemical-specific Dermal Permeability Constant
SAc = Child Skin Surface Area Available for Contact = 1,800 cm^2
ETc = Child Exposure Time = 3 hours/day
EFc = Child Exposure Frequency = 17 days per year
EDc = Child Exposure Duration = 5 years
BWc = Child Body Weight = 15.1 kg
SAa = Adult Skin Surface Area Available for Contact = 2,800 cm^2
ETa = Adult Exposure Time = 1 hour /day
EFa = Adult Exposure Frequency = 2 days per year
EDa = Adult Exposure Duration = 9 years
BW = Adult Body Weight = 57.1 kg
CF = Conversion Factor (1L/1000cm^2)
AT1 = Days Per Year = 365 days/year
AT2 = Averaging Time (70 years for carcinogenic effects, 14 years for non-carcinogenic effects)
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CW (mg/L)	PC[a] (cm/hr)	NON-CANCER HIF (L/kg-dy)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER HIF (L/kg-dy)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)$^{-1}$	CANCER RISK (unitless)
Metals										
Arsenic	1.80E-03	0.001	6.12E-03	1.10E-08	0.0003	3.67E-05	1.22E-03	2.20E-09	1.5	3.31E-09
Thallium	1.10E-03	0.001	6.12E-03	6.73E-09	0.00008	8.42E-05	1.22E-03	1.35E-09		
Vanadium	9.24E-03	0.001	6.12E-03	5.65E-08	0.007	8.08E-06	1.22E-03	1.13E-08		
Volatile Organics										
Carbon disulfide	1.00E-03		6.12E-03		0.1		1.22E-03			
Methylene chloride	2.26E-03		6.12E-03		0.06		1.22E-03		0.0075	
					HAZARD INDEX =	1.29E-04			TOTAL CANCER RISK =	3.31E-09

Note
a Due to the volatility, volatile organics are assumed not available for dermal absorption

TABLE A-30

TINKER AFB SITE - OFF-BASE WEST SOLDIER CREEK (AREA 2)
DERMAL EXPOSURE TO CHEMICALS IN SURFACE WATER DUE TO WADING
OFF-BASE CHILD AND ADULT RESIDENT - RME
(CURRENT AND FUTURE USE SCENARIO)

Equation : HIF ={ [(SAc x ETc x EFc x EDc) / BWc + (SAa x ETa x EFa x EDa) / BWa] / (AT1 x AT2)} x CF
CDI = CW x PC x HIF
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:

HIF = Human Intake Factor
CDI = Chronic Daily Intake
CW = Concentration in Surface Water
PC = Chemical-specific Dermal Permeability Constant
SAc = Child Skin Surface Area Available for Contact = 6,500 cm^2
ETc = Child Exposure Time = 6 hours/day
EFc = Child Exposure Frequency = 34 days per year
EDc = Child Exposure Duration = 5 years
BWc = Child Body Weight = 15.1 kg
SAa = Adult Skin Surface Area Available for Contact = 8,620 cm^2
ETa = Adult Exposure Time = 2 hour /day
EFa = Adult Exposure Frequency = 4 days per year
EDa = Adult Exposure Duration = 25 years
BW = Adult Body Weight = 57.1 kg
CF = Conversion Factor (1L/1000cm^2)
AT1 = Days Per Year = 365 days/year
AT2 = Averaging Time (70 years for carcinogenic effects, 30 years for non-carcinogenic effects)
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CW (mg/L)	PC[a] (cm/hr)	NON-CANCER HIF (L/kg dy)	NON-CANCER CDI (mg/kg dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER HIF (L/kg dy)	CANCER CDI (mg/kg dy)	SF (mg/kg-dy)$^{-1}$	CANCER RISK (unitless)
Metals										
Arsenic	1.80E-03	0.001	4.29E-02	7.71E-08	0.0003	2.57E-04	1.84E-02	3.31E-08	1.5	4.96E-08
Thallium	1.10E-03	0.001	4.29E-02	4.71E-08	0.00008	5.89E-04	1.84E-02	2.02E-08		
Vanadium	1.37E-02	0.001	4.29E-02	5.85E-07	0.007	8.36E-05	1.84E-02	2.51E-07		
Volatile Organics										
Carbon disulfide	1.00E-03		4.29E-02		0.1		1.84E-02			
Methylene chloride	2.70E-03		4.29E-02		0.06		1.84E-02		0.0075	
					HAZARD INDEX =	9.30E-04			TOTAL CANCER RISK =	4.96E-08

Note
a Due to the volatility, volatile organics are assumed not available for dermal absorption

TABLE A-31

TINKER AFB SITE - OFF-BASE EAST SOLDIER CREEK (AREA 4)
DERMAL EXPOSURE TO CHEMICALS IN SURFACE WATER DUE TO WADING AND SWIMMING
OFF-BASE CHILD AND ADULT RESIDENT - AVERAGE EXPOSURE
(CURRENT AND FUTURE USE SCENARIO)

Equation : HIF ={ [(SAc x ETc x EFc x EDc) / BWc + (SAa x ETa x EFa x EDa) / BWa] / (AT1 x AT2)} x CF
CDI = CW x PC x HIF
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
HIF = Human Intake Factor
CDI = Chronic Daily Intake
CW = Concentration in Surface Water
PC = Chemical-specific Dermal Permeability Constant
SAc = Child Skin Surface Area Available for Contact = 1,800 cm^2
ETc = Child Exposure Time = 3 hours/day
EFc = Child Exposure Frequency = 17 days per year
EDc = Child Exposure Duration = 5 years
BWc = Child Body Weight = 15.1 kg
SAa = Adult Skin Surface Area Available for Contact = 2,800 cm^2
ETa = Adult Exposure Time = 1 hour /day
EFa = Adult Exposure Frequency = 2 days per year
EDa = Adult Exposure Duration = 9 years
BW = Adult Body Weight = 57.1 kg
CF = Conversion Factor (1L/1000cm^3)
AT1 = Days Per Year = 365 days/year
AT2 = Averaging Time (70 years for carcinogenic effects, 14 years for non-carcinogenic effects)
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CW (mg/L)	PC[a] (cm/hr)	NON-CANCER HIF (L/kg-dy)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER HIF (L/kg-dy)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)$^{-1}$	CANCER RISK (unitless)
Metals										
Arsenic	1.40E-03	0.001	2.17E-02	3.03E-08	0.0003	1.01E-04	4.33E-03	6.06E-09	1.5	9.09E-09
Cadmium	2.64E-03	0.001	2.17E-02	5.71E-08	0.0005	1.14E-04	4.33E-03	1.14E-08		
Cobalt	5.23E-03	0.001	2.17E-02	1.13E-07	0.06	1.89E-06	4.33E-03	2.26E-08		
Nickel	2.99E-02	0.001	2.17E-02	6.48E-07	0.02	3.24E-05	4.33E-03	1.30E-07		
Thallium	1.20E-03	0.001	2.17E-02	2.60E-08	0.00008	3.25E-04	4.33E-03	5.20E-09		
Vanadium	6.66E-03	0.001	2.17E-02	1.44E-07	0.007	2.06E-05	4.33E-03	2.89E-08		
Chlorinated Pesticides										
Aldrin	5.36E-05	0.0016	2.17E-02	1.86E-09	0.00003	6.18E-05	4.33E-03	3.71E-10	17	6.31E-09
Semivolatile Organics										
bis(2-Ethylhexyl)phthalate	3.60E-03	0.033	2.17E-02	2.57E-06	0.02	1.29E-04	4.33E-03	5.14E-07	0.014	7.20E-09
Phenol	1.20E-03	0.0082	2.17E-02	2.13E-07	[a]	3.04E-08	4.33E-03	4.26E-08		
Volatile Organics										
Acetone	5.30E-03		2.17E-02		0.1		4.33E-03			
Methylene chloride	1.25E-02		2.17E-02		0.06		4.33E-03		0.0075	
				HAZARD INDEX =		7.85E-04		TOTAL CANCER RISK =		2.26E-08

Note:
a Due to the volatility, volatile organics are assumed not available for dermal absorption.

TABLE A-32

TINKER AFB SITE - OFF-BASE EAST SOLDIER CREEK (AREA 4)
DERMAL EXPOSURE TO CHEMICALS IN SURFACE WATER DUE TO WADING AND SWIMMING
OFF-BASE CHILD AND ADULT RESIDENT - RME
(CURRENT AND FUTURE USE SCENARIO)

Equation : HIF ={ [(SAc x ETc x EFc x EDc) / BWc + (SAa x ETa x EFa x EDa) / BWa] / (AT1 x AT2)} x CF
CDI = CW x PC x HIF
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
HIF = Human Intake Factor
CDI = Chronic Daily Intake
CW = Concentration in Surface Water
PC = Chemical-specific Dermal Permeability Constant
SAc = Child Skin Surface Area Available for Contact = 6,500 cm^2
ETc = Child Exposure Time = 6 hours/day
EFc = Child Exposure Frequency = 34 days per year
EDc = Child Exposure Duration = 5 years
BWc = Child Body Weight = 15.1 kg
SAa = Adult Skin Surface Area Available for Contact = 8,620 cm^2
ETa = Adult Exposure Time = 2 hour /day
EFa = Adult Exposure Frequency = 4 days per year
EDa = Adult Exposure Duration = 25 years
BW = Adult Body Weight = 57.1 kg
CF = Conversion Factor (1L/1000cm^3)
AT1 = Days Per Year = 365 days/year
AT2 = Averaging Time (70 years for carcinogenic effects, 30 years for non-carcinogenic effects)
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CW (mg/L)	PC[a] (cm/hr)	NON-CANCER HIF (L/kg-dy)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER HIF (L/kg-dy)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)$^{-1}$	CANCER RISK (unitless)
Metals										
Arsenic	1.40E-03	0.001	4.29E-02	6.00E-08	0.0003	2.00E-04	1.84E-02	2.57E-08	1.5	3.86E-08
Cadmium	2.90E-03	0.001	4.29E-02	1.24E-07	0.0005	2.49E-04	1.84E-02	5.33E-08		
Cobalt	5.66E-03	0.001	4.29E-02	2.43E-07	0.06	4.04E-06	1.84E-02	1.04E-07		
Nickel	5.95E-02	0.001	4.29E-02	2.55E-06	0.02	1.28E-04	1.84E-02	1.09E-06		
Thallium	1.20E-03	0.001	4.29E-02	5.14E-08	0.00008	6.43E-04	1.84E-02	2.20E-08		
Vanadium	8.38E-03	0.001	4.29E-02	3.59E-07	0.007	5.13E-05	1.84E-02	1.54E-07		
Chlorinated Pesticides										
Aldrin	1.00E-04	0.0016	4.29E-02	6.86E-09	0.00003	2.29E-04	1.84E-02	2.94E-09	17	5.00E-08
Semivolatile Organics										
bis(2-Ethylhexyl)phthalate	3.60E-03	0.033	4.29E-02	5.09E-06	0.02	2.55E-04	1.84E-02	2.18E-06	0.014	3.05E-08
Phenol	1.20E-03	0.0082	4.29E-02	4.22E-07	[a]	6.02E-08	1.84E-02	1.81E-07		
Volatile Organics										
Acetone	5.65E-03		4.29E-02		0.1		1.84E-02			
Methylene chloride	5.10E-02		4.29E-02		0.06		1.84E-02		0.0075	
					HAZARD INDEX =	1.76E-03			TOTAL CANCER RISK =	1.19E-07

Note
a. Due to the volatility, volatile organics are assumed not available for dermal absorption.

TABLE A-33

TINKER AFB SITE - OFF-BASE WEST SOLDIER CREEK (AREA 2)
INCIDENTAL INGESTION EXPOSURE TO CHEMICALS IN SEDIMENTS DUE TO WADING
OFF-BASE CHILD AND ADULT RESIDENT - AVERAGE EXPOSURE
(CURRENT AND FUTURE USE SCENARIO)

Equation : HIF = {[(IRc x EFc x EDc) / BWc + (IRa x EFa x EDa) / BWa] x CF}/ (AT1x AT2)
CDI = CS x HIF
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
HIF = Human Intake Factor
CDI = Chronic Daily Intake
CS = Concentration in Sediments
IRc = Child Ingestion Rate = 100mg/day
EFc = Child Exposure Frequency = 17 days per year
EDc = Child Exposure Duration = 5 years
BWc = Child Body Weight = 15.1 kg
IRa = Adult Ingestion Rate = 10mg/day
EFa = Adult Exposure Frequency = 2 days per year
EDa = Adult Exposure Duration = 9 years
BW = Adult Body Weight = 57.1 kg
AT1 = Days Per Year = 365 days/year
AT2 = Averaging Time (70 years for carcinogenic effects, 14 years for non-carcinogenic effects)
CF = Conversion Factor = 0.000001 kg/mg
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CS (mg/kg)	NON-CANCER HIF (mg/kg-dy)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER HIF (mg/kg-dy)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)[1]	CANCER RISK (unitless)
Metals									
Antimony	4.70E+00	1.11E-07	5.21E-07	0.0004	1.30E-03	2.22E-08	1.04E-07		
Beryllium	2.79E-01	1.11E-07	3.09E-08	0.005	6.18E-06	2.22E-08	6.18E-09	4.3	2.66E-08
Cobalt	4.96E+00	1.11E-07	5.50E-07	0.06	9.16E-06	2.22E-08	1.10E-07		
Lead	5.74E+02	1.11E-07	6.36E-05			2.22E-08	1.27E-05		
Mercury	6.75E-02	1.11E-07	7.48E-09	0.0003	2.49E-05	2.22E-08	1.50E-09		
Nickel	5.55E+01	1.11E-07	6.14E-06	0.02	3.07E-04	2.22E-08	1.23E-06		
Vanadium	1.59E+01	1.11E-07	1.76E-06	0.007	2.52E-04	2.22E-08	3.53E-07		
PCBs/Pesticides									
Aldrin	9.80E-03	1.11E-07	1.09E-09	0.00003	3.62E-05	2.22E-08	2.17E-10	17	3.69E-09
Arocior 1254	7.64E-01	1.11E-07	8.46E-08	0.00002	4.23E-03	2.22E-08	1.69E-08		
delta-BHC	1.20E-03	1.11E-07	1.33E-10			2.22E-08	2.66E-11		
Semivolatile organics									
Anthracene	7.50E-02	1.11E-07	8.31E-09	0.3	2.77E-08	2.22E-08	1.66E-09		
Benzo(a)anthracene	6.16E-01	1.11E-07	6.83E-08			2.22E-08	1.37E-08	0.73	9.96E-09
Benzo(a)pyrene	6.16E-01	1.11E-07	6.83E-08			2.22E-08	1.37E-08	7.3	9.96E-08
Benzo(b)fluoranthene	2.45E-01	1.11E-07	2.71E-08			2.22E-08	5.42E-09	0.73	3.96E-09
Benzo(g,h,i)perylene	2.44E-01	1.11E-07	2.71E-08	0.03	9.02E-07	2.22E-08	5.41E-09		
Benzo(k)fluoranthene	8.37E-01	1.11E-07	9.27E-08			2.22E-08	1.85E-08	0.073	1.35E-09
bis(2-Ethylhexyl)phthalate	8.80E-01	1.11E-07	9.75E-08			2.22E-08	1.95E-08	0.014	2.73E-10
Chrysene	7.18E-01	1.11E-07	7.95E-08			2.22E-08	1.59E-08	0.0073	1.16E-10
Dibenz(a,h)anthracene	1.70E-01	1.11E-07	1.88E-08			2.22E-08	3.77E-09	7.3	2.75E-08
Dimethyl phthalate	4.50E-02	1.11E-07	4.98E-09	10	4.98E-10	2.22E-08	9.97E-10		
Fluoranthene	8.30E-01	1.11E-07	9.19E-08	0.04	2.30E-06	2.22E-08	1.84E-08		
Indeno(1,2,3-cd)pyrene	2.38E-01	1.11E-07	2.63E-08			2.22E-08	5.26E-09	0.73	3.84E-09
Phenanthrene	2.67E-01	1.11E-07	2.96E-08	0.03	9.86E-07	2.22E-08	5.92E-09		
Phenol	6.30E-02	1.11E-07	6.98E-09	0.6	1.16E-08	2.22E-08	1.40E-09		
Pyrene	9.67E-01	1.11E-07	1.07E-07	0.03	3.57E-06	2.22E-08	2.14E-08		
Volatile Oragnics									
Acetone	9.28E-03	1.11E-07	1.03E-09	0.1	1.03E-08	2.22E-08	2.05E-10		
Methylene chloride	2.53E-03	1.11E-07	2.80E-10	0.06	4.67E-09	2.22E-08	5.61E-11	0.0075	4.21E-13
Toluene	2.20E-03	1.11E-07	2.44E-10	0.2	1.22E-09	2.22E-08	4.87E-11		
trans-1,2-Dichloroethene	1.50E-03	1.11E-07	1.66E-10	0.02	8.31E-09	2.22E-08	3.32E-11		
				HAZARD INDEX =	6.18E-03			TOTAL CANCER RISK =	1.77E-07

TABLE A-34

TINKER AFB SITE - OFF-BASE WEST SOLDIER CREEK (AREA 2)
INCIDENTAL INGESTION EXPOSURE TO CHEMICALS IN SEDIMENTS DUE TO WADING
OFF-BASE CHILD AND ADULT RESIDENT - RME
(CURRENT AND FUTURE USE SCENARIO)

Equation : HIF = {[(IRc x EFc x EDc) / BWc + (IRa x EFa x EDa) / BWa] x CF}/ (AT1x AT2)
CDI = CS x HIF
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
HIF = Human Intake Factor
CDI = Chronic Daily Intake
CS = Concentration in Sediments
IRc = Child Ingestion Rate = 100mg/day
EFc = Child Exposure Frequency = 17 days per year
EDc = Child Exposure Duration = 5 years
BWc = Child Body Weight = 15.1 kg
IRa = Adult Ingestion Rate = 10mg/day
EFa = Adult Exposure Frequency = 2 days per year
EDa = Adult Exposure Duration = 25 years
BW = Adult Body Weight = 57.1 kg
AT1 = Days Per Year = 365 days/year
AT2 = Averaging Time (70 years for carcinogenic effects, 30 years for non-carcinogenic effects)
CF = Conversion Factor = 0.000001 kg/mg
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CS (mg/kg)	NON-CANCER HIF (mg/kg-dy)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER HIF (mg/kg-dy)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)[1]	CANCER RISK (unitless)
Metals									
Antimony	6.42E+00	2.22E-07	1.42E-06	0.0004	3.56E-03	9.50E-08	6.10E-07		
Beryllium	5.61E-01	2.22E-07	1.24E-07	0.005	2.49E-05	9.50E-08	5.33E-08	4.3	2.29E-07
Cobalt	8.22E+00	2.22E-07	1.82E-06	0.06	3.04E-05	9.50E-08	7.81E-07		
Lead	4.40E+03	2.22E-07	9.75E-04			9.50E-08	4.18E-04		
Mercury	8.14E-02	2.22E-07	1.81E-08	0.0003	6.02E-05	9.50E-08	7.74E-09		
Nickel	2.09E+02	2.22E-07	4.64E-05	0.02	2.32E-03	9.50E-08	1.99E-05		
Vanadium	2.55E+01	2.22E-07	5.66E-06	0.007	8.09E-04	9.50E-08	2.43E-06		
PCBs/Pesticides									
Aldrin	4.50E-02	2.22E-07	9.97E-09	0.00003	3.32E-04	9.50E-08	4.27E-09	17	7.27E-08
Aroclor 1254	1.70E+00	2.22E-07	3.77E-07	0.00002	1.88E-02	9.50E-08	1.61E-07		
delta-BHC	1.20E-03	2.22E-07	2.66E-10			9.50E-08	1.14E-10		
Semivolatile organics									
Anthracene	7.50E-02	2.22E-07	1.66E-08	0.3	5.54E-08	9.50E-08	7.12E-09		
Benzo(a)anthracene	3.23E+00	2.22E-07	7.15E-07			9.50E-08	3.06E-07	0.73	2.24E-07
Benzo(a)pyrene	1.52E+00	2.22E-07	3.36E-07			9.50E-08	1.44E-07	7.3	1.05E-06
Benzo(b)fluoranthene	7.61E-01	2.22E-07	1.69E-07			9.50E-08	7.22E-08	0.73	5.27E-08
Benzo(g,h,i)perylene	5.23E-01	2.22E-07	1.16E-07	0.03	3.87E-06	9.50E-08	4.97E-08		
Benzo(k)fluoranthene	3.54E+00	2.22E-07	7.86E-07			9.50E-08	3.37E-07	0.073	2.46E-08
bis(2-Ethylhexyl)phthalate	4.90E+00	2.22E-07	1.09E-06			9.50E-08	4.65E-07	0.014	6.52E-09
Chrysene	3.70E+00	2.22E-07	8.20E-07			9.50E-08	3.51E-07	0.0073	2.57E-09
Dibenz(a,h)anthracene	1.70E-01	2.22E-07	3.77E-08			9.50E-08	1.61E-08	7.3	1.18E-07
Dimethyl phthalate	4.50E-02	2.22E-07	9.97E-09	10	9.97E-10	9.50E-08	4.27E-09		
Fluoranthene	5.30E+00	2.22E-07	1.17E-06	0.04	2.94E-05	9.50E-08	5.03E-07		
Indeno(1,2,3-cd)pyrene	5.38E-01	2.22E-07	1.19E-07			9.50E-08	5.11E-08	0.73	3.73E-08
Phenanthrene	7.27E-01	2.22E-07	1.61E-07	0.03	5.37E-06	9.50E-08	6.90E-08		
Phenol	6.30E-02	2.22E-07	1.40E-08	0.6	2.33E-08	9.50E-08	5.98E-09		
Pyrene	6.40E+00	2.22E-07	1.42E-06	0.03	4.73E-05	9.50E-08	6.08E-07		
Volatile Oragnics									
Acetone	1.71E-02	2.22E-07	3.79E-09	0.1	3.79E-08	9.50E-08	1.63E-09		
Methylene chloride	3.30E-03	2.22E-07	7.32E-10	0.06	1.22E-08	9.50E-08	3.14E-10	0.0075	2.35E-12
Toluene	2.20E-03	2.22E-07	4.88E-10	0.2	2.44E-09	9.50E-08	2.09E-10		
trans-1,2-Dichloroethene	1.50E-03	2.22E-07	3.32E-10	0.02	1.66E-08	9.50E-08	1.42E-10		
				HAZARD INDEX =	2.61E-02			TOTAL CANCER RISK =	1.82E-06

TABLE A-35

TINKER AFB SITE - OFF-BASE EAST SOLDIER CREEK (AREA 4)
INCIDENTAL INGESTION EXPOSURE TO CHEMICALS IN SEDIMENTS DUE TO WADING AND SWIMMING
OFF-BASE CHILD AND ADULT RESIDENT - AVERAGE EXPOSURE
(FUTURE USE SCENARIO)

Equation HIF = {[(IRc x EFc x EDc) / BWc + (IRa x EFa x EDa) / BWa] x CF}/ (AT1x AT2)
CDI = CS x HIF
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
HIF = Human Intake Factor
CDI = Chronic Daily Intake
CS = Concentration in Sediments
IRc = Child Ingestion Rate = 100mg/day
EFc = Child Exposure Frequency = 17 days per year
EDc = Child Exposure Duration = 5 years
BWc = Child Body Weight = 15.1 kg
IRa = Adult Ingestion Rate = 10mg/day
EFa = Adult Exposure Frequency = 2 days per year
EDa = Adult Exposure Duration = 9 years
BW = Adult Body Weight = 57.1 kg
AT1 = Days Per Year = 365 days/year
AT2 = Averaging Time (70 years for carcinogenic effects, 14 years for non-carcinogenic effects)
CF = Conversion Factor = 0.000001 kg/mg
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CS (mg/kg)	NON-CANCER HIF (mg/kg-dy)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER HIF (mg/kg-dy)	CANCER CDI (mg/kg-dy)	SF $(mg/kg\text{-}dy)^{-1}$	CANCER RISK (unitless)
Metals									
Antimony	3.72E+00	1.11E-07	4.12E-07	0.0004	1.03E-03	2.22E-08	8.24E-08		
Beryllium	3.03E-01	1.11E-07	3.36E-08	0.005	6.72E-06	2.22E-08	6.72E-09	4.3	2.89E-08
Cadmium	1.43E+01	1.11E-07	1.59E-06	0.001	1.59E-03	2.22E-08	3.18E-07		
Cobalt	4.86E+00	1.11E-07	5.39E-07	0.06	8.98E-06	2.22E-08	1.08E-07		
Lead	1.79E+01	1.11E-07	1.98E-06			2.22E-08	3.97E-07		
Mercury	1.25E-01	1.11E-07	1.39E-08	0.0003	4.63E-05	2.22E-08	2.78E-09		
Nickel	5.40E+01	1.11E-07	5.98E-06	0.02	2.99E-04	2.22E-08	1.20E-06		
Silver	2.54E+00	1.11E-07	2.82E-07	0.005	5.64E-05	2.22E-08	5.64E-08		
Thallium	9.01E-01	1.11E-07	9.98E-08	0.00008	1.25E-03	2.22E-08	2.00E-08		
Vanadium	1.79E+01	1.11E-07	1.98E-06	0.007	2.83E-04	2.22E-08	3.96E-07		
PCBs/Pesticides									
Aldrin	1.18E-02	1.11E-07	1.30E-09	0.00003	4.34E-05	2.22E-08	2.61E-10	17	4.43E-09
alpha-BHC	2.00E-03	1.11E-07	2.22E-10			2.22E-08	4.43E-11	6.3	2.79E-10
alpha-Chlordane	4.13E-02	1.11E-07	4.58E-09	0.00006	7.63E-05	2.22E-08	9.16E-10	1.3	1.19E-09
Aroclor 1254	7.21E-01	1.11E-07	7.99E-08	0.00002	3.99E-03	2.22E-08	1.60E-08		
Heptachlor	7.98E-02	1.11E-07	8.84E-09	0.0005	1.77E-05	2.22E-08	1.77E-09	4.5	7.95E-09
Semivolatile organics									
1-Chloronaphthalene	1.30E+00	1.11E-07	1.44E-07	0.03	4.80E-06	2.22E-08	2.88E-08		
2-Chloronaphthalene	6.90E-02	1.11E-07	7.64E-09	0.08	9.55E-08	2.22E-08	1.53E-09		
2-Methylnaphthalene	1.10E-01	1.11E-07	1.22E-08	0.03	4.06E-07	2.22E-08	2.44E-09		
3/4-Methylphenol	1.60E-01	1.11E-07	1.77E-08	0.05	3.54E-07	2.22E-08	3.54E-09		
Acenaphthene	2.20E-01	1.11E-07	2.44E-08	0.06	4.06E-07	2.22E-08	4.87E-09		
Anthracene	1.51E-01	1.11E-07	1.67E-08	0.3	5.58E-08	2.22E-08	3.35E-09		
Benzo(a)anthracene	1.70E-01	1.11E-07	1.88E-08			2.22E-08	3.76E-09	0.73	2.75E-09
Benzo(a)pyrene	1.84E-01	1.11E-07	2.04E-08			2.22E-08	4.08E-09	7.3	2.97E-08
Benzo(b)fluoranthene	2.15E-01	1.11E-07	2.38E-08			2.22E-08	4.77E-09	0.73	3.48E-09
Benzo(g,h,i)perylene	1.63E-01	1.11E-07	1.81E-08	0.03	6.02E-07	2.22E-08	3.61E-09		
Benzo(k)fluoranthene	1.49E-01	1.11E-07	1.65E-08			2.22E-08	3.30E-09	0.073	2.41E-10
bis(2-Ethylhexyl)phthalate	5.98E-01	1.11E-07	6.62E-08			2.22E-08	1.32E-08	0.014	1.85E-10
Chrysene	1.95E-01	1.11E-07	2.16E-08			2.22E-08	4.31E-09	0.0073	3.15E-11
Di-n-butyl phthalate	3.40E-02	1.11E-07	3.77E-09	0.1	3.77E-08	2.22E-08	7.53E-10		
Di-n-octyl phthalate	7.70E-02	1.11E-07	8.53E-09	0.02	4.26E-07	2.22E-08	1.71E-09		
Dibenzofuran	2.06E-01	1.11E-07	2.28E-08	0.004	5.70E-06	2.22E-08	4.56E-09		
Fluoranthene	4.38E-01	1.11E-07	4.86E-08	0.04	1.21E-06	2.22E-08	9.71E-09		
Indeno(1,2,3-cd)pyrene	1.60E-01	1.11E-07	1.77E-08			2.22E-08	3.54E-09	0.73	2.58E-09
Phenanthrene	2.72E-01	1.11E-07	3.01E-08	0.03	1.00E-06	2.22E-08	6.03E-09		
Pyrene	3.11E-01	1.11E-07	3.45E-08	0.03	1.15E-06	2.22E-08	6.90E-09		
Volatile Orgnics									
2-Butanone (MEK)	1.01E-02	1.11E-07	1.12E-09	0.6	1.87E-09	2.22E-08	2.24E-10		
Acetone	2.40E-02	1.11E-07	2.66E-09	0.1	2.66E-08	2.22E-08	5.32E-10		
Acrylonitrile	4.50E-03	1.11E-07	4.98E-10	0.00003	1.66E-05	2.22E-08	9.97E-11	17	1.69E-09
Carbon disulfide	6.77E-03	1.11E-07	7.50E-10	0.1	7.50E-09	2.22E-08	1.50E-10		
Chlorobenzene	3.64E-03	1.11E-07	4.03E-10	0.02	2.02E-08	2.22E-08	8.07E-11		
Methylene chloride	3.85E-03	1.11E-07	4.26E-10	0.06	7.11E-09	2.22E-08	8.53E-11	0.0075	6.40E-13
Toluene	4.61E-02	1.11E-07	5.11E-09	0.2	2.55E-08	2.22E-08	1.02E-09		
					HAZARD INDEX =	8.73E-03		TOTAL CANCER RISK =	8.35E-08

TABLE A-36

TINKER AFB SITE - OFF-BASE EAST SOLDIER CREEK (AREA 4)
INCIDENTAL INGESTION EXPOSURE TO CHEMICALS IN SEDIMENTS DUE TO WADING AND SWIMMING
OFF-BASE CHILD AND ADULT RESIDENT - RME
(FUTURE USE SCENARIO)

Equation HIF = {[(IRc x EFc x EDc) / BWc + (IRa x EFa x EDa) / BWa] x CF}/ (AT1x AT2)
CDI = CS x HIF
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
HIF = Human Intake Factor
CDI = Chronic Daily Intake
CS = Concentration in Sediments
IRc = Child Ingestion Rate = 100mg/day
EFc = Child Exposure Frequency = 17 days per year
EDc = Child Exposure Duration = 5 years
BWc = Child Body Weight = 15.1 kg
IRa = Adult Ingestion Rate = 10mg/day
EFa = Adult Exposure Frequency = 2 days per year
EDa = Adult Exposure Duration = 25 years
BW = Adult Body Weight = 57.1 kg
AT1 = Days Per Year = 365 days/year
AT2 = Averaging Time (70 years for carcinogenic effects, 30 years for non-carcinogenic effects)
CF = Conversion Factor = 0.000001 kg/mg
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CS (mg/kg)	NON-CANCER HIF (mg/kg-dy)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER HIF (mg/kg-dy)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)$^{-1}$	CANCER RISK (unitless)
Metals									
Antimony	3.94E+00	2.22E-07	8.74E-07	0.0004	2.18E-03	9.50E-08	3.75E-07		
Beryllium	4.60E-01	2.22E-07	1.02E-07	0.005	2.04E-05	9.50E-08	4.37E-08	4.3	1.88E-07
Cadmium	1.23E+02	2.22E-07	2.73E-05	0.001	2.73E-02	9.50E-08	1.17E-05		
Cobalt	6.75E+00	2.22E-07	1.50E-06	0.06	2.49E-05	9.50E-08	6.41E-07		
Lead	7.48E+01	2.22E-07	1.66E-05			9.50E-08	7.10E-06		
Mercury	6.00E-01	2.22E-07	1.33E-07	0.0003	4.43E-04	9.50E-08	5.70E-08		
Nickel	3.26E+02	2.22E-07	7.22E-05	0.02	3.61E-03	9.50E-08	3.10E-05		
Silver	1.62E+01	2.22E-07	3.59E-06	0.005	7.18E-04	9.50E-08	1.54E-06		
Thallium	6.00E-01	2.22E-07	1.33E-07	0.00008	1.66E-03	9.50E-08	5.70E-08		
Vanadium	2.34E+01	2.22E-07	5.20E-06	0.007	7.42E-04	9.50E-08	2.23E-06		
PCBs/Pesticides									
Aldrin	5.00E-02	2.22E-07	1.11E-08	0.00003	3.69E-04	9.50E-08	4.75E-09	17	8.07E-08
alpha-BHC	9.70E+00	2.22E-07	2.15E-06			9.50E-08	9.21E-07	6.3	5.80E-06
alpha-Chlordane	5.00E-02	2.22E-07	1.11E-08	0.00006	1.85E-04	9.50E-08	4.75E-09	1.3	6.17E-09
Aroclor 1254	5.00E-02	2.22E-07	1.11E-08	0.00002	5.54E-04	9.50E-08	4.75E-09		
Heptachlor	9.70E-01	2.22E-07	2.15E-07	0.0005	4.30E-04	9.50E-08	9.21E-08	4.5	4.15E-07
Semivolatile organics									
1-Chloronaphthalene	1.65E+00	2.22E-07	3.66E-07	0.03	1.22E-05	9.50E-08	1.57E-07		
2-Chloronaphthalene	4.05E-01	2.22E-07	8.98E-08	0.08	1.12E-06	9.50E-08	3.85E-08		
2-Methylnaphthalene	2.30E-01	2.22E-07	5.10E-08	0.03	1.70E-06	9.50E-08	2.18E-08		
3/4-Methylphenol	2.97E-01	2.22E-07	6.59E-08	0.05	1.32E-06	9.50E-08	2.82E-08		
Acenaphthene	3.58E-01	2.22E-07	7.93E-08	0.06	1.32E-06	9.50E-08	3.40E-08		
Anthracene	7.90E-01	2.22E-07	1.75E-07	0.3	5.84E-07	9.50E-08	7.50E-08		
Benzo(a)anthracene	1.50E+00	2.22E-07	3.32E-07			9.50E-08	1.42E-07	0.73	1.04E-07
Benzo(a)pyrene	1.30E+00	2.22E-07	2.88E-07			9.50E-08	1.23E-07	7.3	9.01E-07
Benzo(b)fluoranthene	2.30E+00	2.22E-07	5.10E-07			9.50E-08	2.18E-07	0.73	1.59E-07
Benzo(g,h,i)perylene	6.00E-01	2.22E-07	1.33E-07	0.03	4.43E-06	9.50E-08	5.70E-08		
Benzo(k)fluoranthene	4.05E-01	2.22E-07	8.98E-08			9.50E-08	3.85E-08	0.073	2.81E-09
bis(2-Ethylhexyl)phthalate	3.00E+00	2.22E-07	6.65E-07			9.50E-08	2.85E-07	0.014	3.99E-09
Chrysene	2.10E+00	2.22E-07	4.65E-07			9.50E-08	1.99E-07	0.0073	1.46E-09
Di-n-butyl phthalate	4.05E-01	2.22E-07	8.98E-08	0.1	8.98E-07	9.50E-08	3.85E-08		
Di-n-octyl phthalate	4.05E-01	2.22E-07	8.98E-08	0.02	4.49E-06	9.50E-08	3.85E-08		
Dibenzofuran	2.38E-01	2.22E-07	5.28E-08	0.004	1.32E-05	9.50E-08	2.26E-08		
Fluoranthene	4.40E+00	2.22E-07	9.75E-07	0.04	2.44E-05	9.50E-08	4.18E-07		
Indeno(1,2,3-cd)pyrene	6.30E-01	2.22E-07	1.40E-07			9.50E-08	5.98E-08	0.73	4.37E-08
Phenanthrene	4.60E+00	2.22E-07	1.02E-06	0.03	3.40E-05	9.50E-08	4.37E-07		
Pyrene	3.60E+00	2.22E-07	7.98E-07	0.03	2.66E-05	9.50E-08	3.42E-07		
Volatile Oragnics	0.00E+00								
2-Butanone (MEK)	6.96E-02	2.22E-07	1.54E-08	0.6	2.57E-08	9.50E-08	6.61E-09		
Acetone	7.00E-01	2.22E-07	1.55E-07	0.1	1.55E-06	9.50E-08	6.65E-08		
Acrylonutrile	2.67E-02	2.22E-07	5.91E-09	0.00003	1.97E-04	9.50E-08	2.53E-09	17	4.31E-08
Carbon disulfide	3.50E-02	2.22E-07	7.76E-09	0.1	7.76E-08	9.50E-08	3.32E-09		
Chlorobenzene	3.50E-02	2.22E-07	7.76E-09	0.02	3.88E-07	9.50E-08	3.32E-09		
Methylene chloride	1.10E+00	2.22E-07	2.44E-07	0.06	4.06E-06	9.50E-08	1.04E-07	0.0075	7.84E-10
Toluene	1.08E-02	2.22E-07	2.40E-09	0.2	1.20E-08	9.50E-08	1.03E-09		
					HAZARD INDEX =	3.85E-02			TOTAL CANCER RISK = 7.75E-06

TABLE A-37

TINKER AFB SITE - OFF-BASE EAST SOLDIER CREEK (AREA 4)
INCIDENTAL INGESTION EXPOSURE TO CHEMICALS IN SEDIMENTS DUE TO WADING AND SWIMMING
OFF-BASE CHILD AND ADULT RESIDENT - AVERAGE EXPOSURE
(CURRENT USE SCENARIO)

Equation HIF = {[(IRc x EFc x EDc) / BWc + (IRa x EFa x EDa) / BWa] x CF}/ (AT1x AT2)
CDI = CS x HIF
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
HIF = **Human Intake Factor**
CDI = **Chronic Daily Intake**
CS = **Concentration in Sediments**
IRc = **Child Ingestion Rate = 100mg/day**
EFc = **Child Exposure Frequency = 17 days per year**
EDc = **Child Exposure Duration = 5 years**
BWc = **Child Body Weight = 15.1 kg**
IRa = **Adult Ingestion Rate = 10mg/day**
EFa = **Adult Exposure Frequency = 2 days per year**
EDa = **Adult Exposure Duration = 9 years**
BW = **Adult Body Weight = 57.1 kg**
AT1 = **Days Per Year = 365 days/year**
AT2 = **Averaging Time (70 years for carcinogenic effects, 14 years for non-carcinogenic effects)**
CF = **Conversion Factor = 0.000001 kg/mg**
SF = **Slope Factor**
RfD = **Reference Dose**

CHEMICALS OF CONCERN	CS (mg/kg)	NON-CANCER HIF (mg/kg-dy)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER HIF (mg/kg-dy)	CANCER CDI (mg/kg-dy)	SF $(mg/kg\text{-}dy)^{-1}$	CANCER RISK (unitless)
Metals									
Antimony	3.76E+00	1.11E-07	4.16E-07	0.0004	1.04E-03	2.22E-08	8.32E-08		
Beryllium	2.66E-01	1.11E-07	2.94E-08	0.005	5.88E-06	2.22E-08	5.88E-09	4.3	2.53E-08
Cadmium	2.79E+01	1.11E-07	3.09E-06	0.001	3.09E-03	2.22E-08	6.18E-07		
Cobalt	4.73E+00	1.11E-07	5.24E-07	0.06	8.73E-06	2.22E-08	1.05E-07		
Lead	2.50E+01	1.11E-07	2.77E-06			2.22E-08	5.54E-07		
Mercury	1.57E-01	1.11E-07	1.74E-08	0.0003	5.79E-05	2.22E-08	3.47E-09		
Nickel	9.91E+01	1.11E-07	1.10E-05	0.02	5.49E-04	2.22E-08	2.19E-06		
Silver	4.57E+00	1.11E-07	5.06E-07	0.005	1.01E-04	2.22E-08	1.01E-07		
Thallium	3.44E-01	1.11E-07	3.81E-08	0.00008	4.76E-04	2.22E-08	7.62E-09		
Vanadium	1.72E+01	1.11E-07	1.90E-06	0.007	2.72E-04	2.22E-08	3.80E-07		
PCBs/Pesticides									
Aldrin	1.02E-02	1.11E-07	1.13E-09	0.00003	3.75E-05	2.22E-08	2.25E-10	17	3.83E-09
alpha-BHC	1.44E+00	1.11E-07	1.60E-07			2.22E-08	3.19E-08	6.3	2.01E-07
alpha-Chlordane	8.23E-03	1.11E-07	9.11E-10	0.00006	1.52E-05	2.22E-08	1.82E-10	1.3	2.37E-10
Aroclor 1254	9.04E-03	1.11E-07	1.00E-09	0.00002	5.01E-05	2.22E-08	2.00E-10		
Heptachlor	1.98E-01	1.11E-07	2.20E-08	0.0005	4.39E-05	2.22E-08	4.39E-09	4.5	1.98E-08
Semivolatile organics									
1-Chloronaphthalene	1.54E+00	1.11E-07	1.70E-07	0.03	5.67E-06	2.22E-08	3.40E-08		
2-Chloronaphthalene	1.83E-01	1.11E-07	2.03E-08	0.08	2.54E-07	2.22E-08	4.06E-09		
2-Methylnaphthalene	1.94E-01	1.11E-07	2.14E-08	0.03	7.15E-07	2.22E-08	4.29E-09		
3/4-Methylphenol	2.31E-01	1.11E-07	2.56E-08	0.05	5.11E-07	2.22E-08	5.11E-09		
Acenaphthene	2.55E-01	1.11E-07	2.82E-08	0.06	4.71E-07	2.22E-08	5.65E-09		
Anthracene	2.26E-01	1.11E-07	2.50E-08	0.3	8.35E-08	2.22E-08	5.01E-09		
Benzo(a)anthracene	2.60E-01	1.11E-07	2.88E-08			2.22E-08	5.77E-09	0.73	4.21E-09
Benzo(a)pyrene	2.47E-01	1.11E-07	2.74E-08			2.22E-08	5.47E-09	7.3	4.00E-08
Benzo(b)fluoranthene	3.51E-01	1.11E-07	3.89E-08			2.22E-08	7.79E-09	0.73	5.68E-09
Benzo(g,h,i)perylene	2.05E-01	1.11E-07	2.27E-08	0.03	7.57E-07	2.22E-08	4.54E-09		
Benzo(k)fluoranthene	1.67E-01	1.11E-07	1.85E-08			2.22E-08	3.70E-09	0.073	2.70E-10
bis(2-Ethylhexyl)phthalate	8.23E-01	1.11E-07	9.11E-08			2.22E-08	1.82E-08	0.014	2.55E-10
Chrysene	3.18E-01	1.11E-07	3.52E-08			2.22E-08	7.04E-09	0.0073	5.14E-11
Di-n-butyl phthalate	1.86E-01	1.11E-07	2.06E-08	0.1	2.06E-07	2.22E-08	4.12E-09		
Di-n-octyl phthalate	2.15E-01	1.11E-07	2.38E-08	0.02	1.19E-06	2.22E-08	4.76E-09		
Dibenzofuran	2.16E-01	1.11E-07	2.40E-08	0.004	5.99E-06	2.22E-08	4.80E-09		
Fluoranthene	7.17E-01	1.11E-07	7.94E-08	0.04	1.99E-06	2.22E-08	1.59E-08		
Indeno(1,2,3-cd)pyrene	2.08E-01	1.11E-07	2.31E-08			2.22E-08	4.62E-09	0.73	3.37E-09
Phenanthrene	6.13E-01	1.11E-07	6.79E-08	0.03	2.26E-06	2.22E-08	1.36E-08		
Pyrene	4.89E-01	1.11E-07	5.42E-08	0.03	1.81E-06	2.22E-08	1.08E-08		
Volatile Orgnics									
2-Butanone (MEK)	1.93E-02	1.11E-07	2.14E-09	0.6	3.56E-09	2.22E-08	4.27E-10		
Acetone	1.12E-01	1.11E-07	1.24E-08	0.1	1.24E-07	2.22E-08	2.49E-09		
Acrylonitrile	7.93E-03	1.11E-07	8.78E-10	0.00003	2.93E-05	2.22E-08	1.76E-10	17	2.99E-09
Carbon disulfide	5.94E-03	1.11E-07	6.59E-10	0.1	6.59E-09	2.22E-08	1.32E-10		
Chlorobenzene	6.73E-03	1.11E-07	7.46E-10	0.02	3.73E-08	2.22E-08	1.49E-10		
Methylene chloride	1.24E-01	1.11E-07	1.38E-08	0.06	2.29E-07	2.22E-08	2.75E-09	0.0075	2.07E-11
Toluene	1.08E-02	1.11E-07	1.20E-09	0.2	6.01E-09	2.22E-08	2.40E-10		
				HAZARD INDEX =	5.80E-03			TOTAL CANCER RISK =	3.07E-07

TABLE A-38

TINKER AFB SITE - OFF-BASE EAST SOLDIER CREEK (AREA 4)
INCIDENTAL INGESTION EXPOSURE TO CHEMICALS IN SEDIMENTS DUE TO WADING AND SWIMMING
OFF-BASE CHILD AND ADULT RESIDENT - RME
(CURRENT USE SCENARIO)

Equation HIF = {[(IRc x EFc x EDc) / BWc + (IRa x EFa x EDa) / BWa] x CF}/ (AT1x AT2)
CDI = CS x HIF
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
HIF = Human Intake Factor
CDI = Chronic Daily Intake
CS = Concentration in Sediments
IRc = Child Ingestion Rate = 100mg/day
EFc = Child Exposure Frequency = 17 days per year
EDc = Child Exposure Duration = 5 years
BWc = Child Body Weight = 15.1 kg
IRa = Adult Ingestion Rate = 10mg/day
EFa = Adult Exposure Frequency = 2 days per year
EDa = Adult Exposure Duration = 25 years
BW = Adult Body Weight = 57.1 kg
AT1 = Days Per Year = 365 days/year
AT2 = Averaging Time (70 years for carcinogenic effects, 30 years for non-carcinogenic effects)
CF = Conversion Factor = 0.000001 kg/mg
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CS (mg/kg)	NON-CANCER HIF (mg/kg-dy)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER HIF (mg/kg-dy)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)$^{-1}$	CANCER RISK (unitless)
Metals									
Antimony	3.82E+00	2.22E-07	8.47E-07	0.0004	2.12E-03	9.50E-08	3.63E-07		
Beryllium	4.78E-01	2.22E-07	1.06E-07	0.005	2.12E-05	9.50E-08	4.54E-08	4.3	1.95E-07
Cadmium	1.23E+02	2.22E-07	2.73E-05	0.001	2.73E-02	9.50E-08	1.17E-05		
Cobalt	5.85E+00	2.22E-07	1.30E-06	0.06	2.16E-05	9.50E-08	5.56E-07		
Lead	3.75E+01	2.22E-07	8.30E-06			9.50E-08	3.56E-06		
Mercury	1.64E-01	2.22E-07	3.64E-08	0.0003	1.21E-04	9.50E-08	1.56E-08		
Nickel	1.21E+02	2.22E-07	2.69E-05	0.02	1.35E-03	9.50E-08	1.15E-05		
Silver	4.95E+00	2.22E-07	1.10E-06	0.005	2.20E-04	9.50E-08	4.71E-07		
Thallium	1.09E+00	2.22E-07	2.41E-07	0.00008	3.02E-03	9.50E-08	1.03E-07		
Vanadium	2.03E+01	2.22E-07	4.50E-06	0.007	6.43E-04	9.50E-08	1.93E-06		
PCBs/Pesticides									
Aldrin	4.01E-02	2.22E-07	8.90E-09	0.00003	2.97E-04	9.50E-08	3.81E-09	17	6.48E-08
alpha-BHC	2.00E-03	2.22E-07	4.43E-10			9.50E-08	1.90E-10	6.3	1.20E-09
alpha-Chlordane	7.48E-02	2.22E-07	1.66E-08	0.00006	2.76E-04	9.50E-08	7.10E-09	1.3	9.23E-09
Aroclor 1254	9.70E+00	2.22E-07	2.15E-06	0.00002	1.07E-01	9.50E-08	9.21E-07		
Heptachlor	9.70E-01	2.22E-07	2.15E-07	0.0005	4.30E-04	9.50E-08	9.21E-08	4.5	4.15E-07
Semivolatile organics									
1-Chloronaphthalene	1.30E+00	2.22E-07	2.88E-07	0.03	9.60E-06	9.50E-08	1.23E-07		
2-Chloronaphthalene	6.90E-02	2.22E-07	1.53E-08	0.08	1.91E-07	9.50E-08	6.55E-09		
2-Methylnaphthalene	1.10E-01	2.22E-07	2.44E-08	0.03	8.13E-07	9.50E-08	1.04E-08		
3/4-Methylphenol	1.60E-01	2.22E-07	3.55E-08	0.05	7.09E-07	9.50E-08	1.52E-08		
Acenaphthene	2.41E-01	2.22E-07	5.34E-08	0.06	8.90E-07	9.50E-08	2.29E-08		
Anthracene	5.34E-01	2.22E-07	1.18E-07	0.3	3.95E-07	9.50E-08	5.08E-08		
Benzo(a)anthracene	5.78E-01	2.22E-07	1.28E-07			9.50E-08	5.49E-08	0.73	4.01E-08
Benzo(a)pyrene	6.57E-01	2.22E-07	1.46E-07			9.50E-08	6.24E-08	7.3	4.56E-07
Benzo(b)fluoranthene	7.20E-01	2.22E-07	1.60E-07			9.50E-08	6.84E-08	0.73	4.99E-08
Benzo(g,h,i)perylene	6.00E-01	2.22E-07	1.33E-07	0.03	4.43E-06	9.50E-08	5.70E-08		
Benzo(k)fluoranthene	5.51E-01	2.22E-07	1.22E-07			9.50E-08	5.23E-08	0.073	3.82E-09
bis(2-Ethylhexyl)phthalate	4.50E+00	2.22E-07	9.97E-07			9.50E-08	4.27E-07	0.014	5.98E-09
Chrysene	6.10E-01	2.22E-07	1.35E-07			9.50E-08	5.80E-08	0.0073	4.23E-10
Di-n-butyl phthalate	3.40E-02	2.22E-07	7.54E-09	0.1	7.54E-08	9.50E-08	3.23E-09		
Di-n-octyl phthalate	7.70E-02	2.22E-07	1.71E-08	0.02	8.53E-07	9.50E-08	7.31E-09		
Dibenzofuran	2.13E-01	2.22E-07	4.71E-08	0.004	1.18E-05	9.50E-08	2.02E-08		
Fluoranthene	1.67E+00	2.22E-07	3.70E-07	0.04	9.25E-06	9.50E-08	1.59E-07		
Indeno(1,2,3-cd)pyrene	6.30E-01	2.22E-07	1.40E-07			9.50E-08	5.98E-08	0.73	4.37E-08
Phenanthrene	6.93E-01	2.22E-07	1.54E-07	0.03	5.12E-06	9.50E-08	6.58E-08		
Pyrene	2.59E+00	2.22E-07	5.75E-07	0.03	1.92E-05	9.50E-08	2.46E-07		
Volatile Orgnics									
2-Butanone (MEK)	1.28E-02	2.22E-07	2.84E-09	0.6	4.73E-09	9.50E-08	1.22E-09		
Acetone	3.98E-02	2.22E-07	8.83E-09	0.1	8.83E-08	9.50E-08	3.78E-09		
Acrylonitrile	4.50E-03	2.22E-07	9.97E-10	0.00003	3.32E-05	9.50E-08	4.27E-10	17	7.27E-09
Carbon disulfide	9.47E-03	2.22E-07	2.10E-09	0.1	2.10E-08	9.50E-08	8.99E-10		
Chlorobenzene	7.00E-03	2.22E-07	1.55E-09	0.02	7.76E-08	9.50E-08	6.65E-10		
Methylene chloride	6.95E-03	2.22E-07	1.54E-09	0.06	2.57E-08	9.50E-08	6.60E-10	0.0075	4.95E-12
Toluene	1.89E-01	2.22E-07	4.18E-08	0.2	2.09E-07	9.50E-08	1.79E-08		

HAZARD INDEX = 1.43E-01 TOTAL CANCER RISK = 1.29E-06

TABLE A-39

TINKER AFB SITE - OFF-BASE WEST SOLDIER CREEK (AREA 2)
DERMAL EXPOSURE TO CHEMICALS IN SEDIMENTS DUE TO WADING
OFF-BASE CHILD AND ADULT RESIDENT - AVERAGE EXPOSURE
(CURRENT AND FUTURE USE SCENARIO)

Equation : HIF = {[(SAc x EFc x EDc x ABS) / BWc + (SAa x EFa x EDa x ABS) / BWa] x CF} / (AT1 x AT2)
CDI = CS x AF x HIF
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
HIF = Human Intake Factor
CDI = Chronic Daily Intake
CS = Concentration in Sediments
SAc = Child Skin Surface Area Available for Contact = 6,500 cm^2
EFc = Child Exposure Frequency = 17 days per year
EDc = Child Exposure Duration = 5 years
BWc = Child Body Weight = 15.1 kg
SAa = Adult Skin Surface Area Available for Contact = 2,800 cm^2
EFa = Adult Exposure Frequency = 2 days per year
EDa = Adult Exposure Duration = 9 years
BW = AdultBody Weight = 57.1 kg
AF = Adherence Factor = 1.0% for organics and 0.1% for inorganics
ABS = Absorption Factor = 0.2
AT1 = Days Per Year = 365 days/year
AT2 = Averaging Time (70 years for carcinogenic effects, 14 years for non-carcinogenic effects)
CF = Conversion Factor = 0.000001 kg/mg
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CS (mg/kg)	NON-CANCER HIF (mg/kg-dy)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER HIF (mg/kg-dy)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)$^{-1}$	CANCER RISK (unitless)
Metals									
Antimony	4.70E+00	2.16E-09	2.03E-09	0.0004	5.07E-06	4.31E-10	4.05E-10		
Beryllium	2.79E-01	2.16E-09	1.20E-10	0.005	2.40E-08	4.31E-10	2.40E-11	4.3	1.03E-10
Cobalt	4.96E+00	2.16E-09	2.14E-09	0.06	3.57E-08	4.31E-10	4.28E-10		
Lead	5.74E+02	2.16E-09	2.48E-07			4.31E-10	4.95E-08		
Mercury	6.75E-02	2.16E-09	2.91E-11	0.0003	9.70E-08	4.31E-10	5.82E-12		
Nickel	5.55E+01	2.16E-09	2.39E-08	0.02	1.20E-06	4.31E-10	4.78E-09		
Vanadium	1.59E+01	2.16E-09	6.87E-09	0.007	9.81E-07	4.31E-10	1.37E-09		
PCBs/Pesticides									
Aldrin	9.80E-03	2.16E-08	4.22E-11	0.00003	1.41E-06	4.31E-09	8.45E-12	17	1.44E-10
Aroclor 1254	7.64E-01	2.16E-08	3.29E-09	0.00002	1.65E-04	4.31E-09	6.59E-10		
delta-BHC	1.20E-03	2.16E-08	5.17E-12			4.31E-09	1.03E-12		
Semivolatile organics									
Anthracene	7.50E-02	2.16E-08	3.23E-10	0.3	1.08E-09	4.31E-09	6.47E-11		
Benzo(a)anthracene	6.16E-01	2.16E-08	2.66E-09			4.31E-09	5.31E-10	0.73	3.88E-10
Benzo(a)pyrene	6.16E-01	2.16E-08	2.66E-09			4.31E-09	5.31E-10	7.3	3.88E-09
Benzo(b)fluoranthene	2.45E-01	2.16E-08	1.06E-09			4.31E-09	2.11E-10	0.73	1.54E-10
Benzo(g,h,i)perylene	2.44E-01	2.16E-08	1.05E-09	0.03	3.51E-08	4.31E-09	2.11E-10		
Benzo(k)fluoranthene	8.37E-01	2.16E-08	3.61E-09			4.31E-09	7.22E-10	0.073	5.27E-11
bis(2-Ethylhexyl)phthalate	8.80E-01	2.16E-08	3.79E-09			4.31E-09	7.59E-10	0.014	1.06E-11
Chrysene	7.18E-01	2.16E-08	3.09E-09			4.31E-09	6.19E-10	0.0073	4.52E-12
Dibenz(a,h)anthracene	1.70E-01	2.16E-08	7.33E-10			4.31E-09	1.47E-10	7.3	1.07E-09
Dimethyl phthalate	4.50E-02	2.16E-08	1.94E-10	10	1.94E-11	4.31E-09	3.88E-11		
Fluoranthene	8.30E-01	2.16E-08	3.58E-09	0.04	8.94E-08	4.31E-09	7.15E-10		
Indeno(1,2,3-cd)pyrene	2.38E-01	2.16E-08	1.02E-09			4.31E-09	2.05E-10	0.73	1.49E-10
Phenanthrene	2.67E-01	2.16E-08	1.15E-09	0.03	3.84E-08	4.31E-09	2.30E-10		
Phenol	6.30E-02	2.16E-08	2.72E-10	0.6	4.53E-10	4.31E-09	5.43E-11		
Pyrene	9.67E-01	2.16E-08	4.17E-09	0.03	1.39E-07	4.31E-09	8.34E-10		
Volatile Oragnics									
Acetone	9.28E-03	2.16E-08	4.00E-11	0.1	4.00E-10	4.31E-09	8.00E-12		
Methylene chloride	2.53E-03	2.16E-08	1.09E-11	0.06	1.82E-10	4.31E-09	2.18E-12	0.0075	1.64E-14
Toluene	2.20E-03	2.16E-08	9.48E-12	0.2	4.74E-11	4.31E-09	1.90E-12		
trans-1,2-Dichloroethene	1.50E-03	2.16E-08	6.47E-12	0.02	3.23E-10	4.31E-09	1.29E-12		
				HAZARD INDEX =	1.74E-04			TOTAL CANCER RISK =	5.95E-09

TABLE A-40

TINKER AFB SITE - OFF-BASE WEST SOLDIER CREEK (AREA 2)
DERMAL EXPOSURE TO CHEMICALS IN SEDIMENTS DUE TO WADING
OFF-BASE CHILD AND ADULT RESIDENT - RME
(CURRENT AND FUTURE USE SCENARIO)

Equation : HIF = {[(SAc x EFc x EDc x ABS) / BWc + (SAa x EFa x EDa x ABS) / BWa] x CF} / (AT1 x AT2)
CDI = CS x AF x HIF
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
HIF = Human Intake Factor
CDI = Chronic Daily Intake
CS = Concentration in Sediments
SAc = Child Skin Surface Area Available for Contact = 6,500 cm^2
EFc = Child Exposure Frequency = 34 days per year
EDc = Child Exposure Duration = 5 years
BWc = Child Body Weight = 15.1 kg
SAa = Adult Skin Surface Area Available for Contact = 8,600 cm^2
EFa = Adult Exposure Frequency = 4 days per year
EDa = Adult Exposure Duration = 25 years
BW = AdultBody Weight = 57.1 kg
AF = Adherence Factor = 1.0% for organics and 0.1% for inorganics
ABS = Absorption Factor = 1.0
AT1 = Days Per Year = 365 days/year
AT2 = Averaging Time (70 years for carcinogenic effects, 30 years for non-carcinogenic effects)
CF = Conversion Factor = 0.000001 kg/mg
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CS (mg/kg)	NON-CANCER HIF (mg/kg-dy)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER HIF (mg/kg-dy)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)$^{-1}$	CANCER RISK (unitless)
Metals									
Antimony	6.42E+00	8.06E-09	5.18E-08	0.0004	1.29E-04	3.45E-09	2.22E-08		
Beryllium	5.61E-01	8.06E-09	4.52E-09	0.005	9.05E-07	3.45E-09	1.94E-09	4.3	8.34E-09
Cobalt	8.22E+00	8.06E-09	6.63E-08	0.06	1.10E-06	3.45E-09	2.84E-08		
Lead	4.40E+03	8.06E-09	3.55E-05			3.45E-09	1.52E-05		
Mercury	8.14E-02	8.06E-09	6.57E-10	0.0003	2.19E-06	3.45E-09	2.81E-10		
Nickel	2.09E+02	8.06E-09	1.69E-06	0.02	8.43E-05	3.45E-09	7.23E-07		
Vanadium	2.55E+01	8.06E-09	2.06E-07	0.007	2.94E-05	3.45E-09	8.83E-08		
PCBs/Pesticides									
Aldrin	4.50E-02	8.06E-08	3.63E-09	0.00003	1.21E-04	3.45E-08	1.55E-09	17	2.64E-08
Aroclor 1254	1.70E+00	8.06E-08	1.37E-07	0.00002	6.85E-03	3.45E-08	5.87E-08		
delta-BHC	1.20E-03								
Semivolatile organics									
Anthracene	7.50E-02	8.06E-08	6.05E-09	0.3	2.02E-08	3.45E-08	2.59E-09		
Benzo(a)anthracene	3.23E+00	8.06E-08	2.60E-07			3.45E-08	1.11E-07	0.73	8.14E-08
Benzo(a)pyrene	1.52E+00	8.06E-08	1.22E-07			3.45E-08	5.24E-08	7.3	3.82E-07
Benzo(b)fluoranthene	7.61E-01	8.06E-08	6.13E-08			3.45E-08	2.63E-08	0.73	1.92E-08
Benzo(g,h,i)perylene	5.23E-01			0.03					
Benzo(k)fluoranthene	3.54E+00	8.06E-08	2.86E-07			3.45E-08	1.22E-07	0.073	8.94E-09
bis(2-Ethylhexyl)phthalate	4.90E+00	8.06E-08	3.95E-07			3.45E-08	1.69E-07	0.014	2.37E-09
Chrysene	3.70E+00	8.06E-08	2.98E-07			3.45E-08	1.28E-07	0.0073	9.33E-10
Dibenz(a,h)anthracene	1.70E-01	8.06E-08	1.37E-08			3.45E-08	5.87E-09	7.3	4.29E-08
Dimethyl phthalate	4.50E-02	8.06E-08	3.63E-09	10	3.63E-10	3.45E-08	1.55E-09		
Fluoranthene	5.30E+00	8.06E-08	4.27E-07	0.04	1.07E-05	3.45E-08	1.83E-07		
Indeno(1,2,3-cd)pyrene	5.38E-01	8.06E-08	4.34E-08			3.45E-08	1.86E-08	0.73	1.36E-08
Phenanthrene	7.27E-01	8.06E-08	5.86E-08	0.03	1.95E-06	3.45E-08	2.51E-08		
Phenol	6.30E-02	8.06E-08	5.08E-09	0.6	8.46E-09	3.45E-08	2.18E-09		
Pyrene	6.40E+00	8.06E-08	5.16E-07	0.03	1.72E-05	3.45E-08	2.21E-07		
Volatile Oragnics									
Acetone	1.71E-02	8.06E-08	1.38E-09	0.1	1.38E-08	3.45E-08	5.91E-10		
Methylene chloride	3.30E-03	8.06E-08	2.66E-10	0.06	4.44E-09	3.45E-08	1.14E-10	0.0075	8.56E-13
Toluene	2.20E-03	8.06E-08	1.77E-10	0.2	8.87E-10	3.45E-08	7.60E-11		
trans-1,2-Dichloroethene	1.50E-03	8.06E-08	1.21E-10	0.02	6.05E-09	3.45E-08	5.18E-11		
				HAZARD INDEX =	7.25E-03			TOTAL CANCER RISK =	5.86E-07

TABLE A-41

TINKER AFB SITE - OFF-BASE EAST SOLDIER CREEK (AREA 4)
DERMAL EXPOSURE TO CHEMICALS IN SEDIMENTS DUE TO WADING AND SWIMMING
OFF-BASE CHILD AND ADULT RESIDENT - AVERAGE EXPOSURE
(FUTURE USE SCENARIO)

Equation: HIF = {[(SAc x EFc x EDc x ABS) / BWc + (SAa x EFa x EDa x ABS) / BWa] x CF} / (AT1 x AT2)
CDI = CS x AF x HIF
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
HIF = Human Intake Factor
CDI = Chronic Daily Intake
CS = Concentration in Sediments
SAc = Child Skin Surface Area Available for Contact = 6,500 cm^2
EFc = Child Exposure Frequency = 17 days per year
EDc = Child Exposure Duration = 5 years
BWc = Child Body Weight = 15.1 kg
SAa = Adult Skin Surface Area Available for Contact = 2,800 cm^2
EFa = Adult Exposure Frequency = 2 days per year
EDa = Adult Exposure Duration = 9 years
BW = AdultBody Weight = 57.1 kg
AF = Adherence Factor = 1.0% for organics and 0.1% for inorganics
ABS = Absorption Factor = 0.2
AT1 = Days Per Year = 365 days/year
AT2 = Averaging Time (70 years for carcinogenic effects, 14 years for non-carcinogenic effects)
CF = Conversion Factor = 0.000001 kg/mg
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CS (mg/kg)	NON-CANCER HIF (mg/kg-dy)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER HIF (mg/kg-dy)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)$^{-1}$	CANCER RISK (unitless)
Metals									
Antimony	3.72E+00	7.33E-09	5.46E-09	0.0004	1.36E-05	1.47E-09	1.09E-09		
Beryllium	3.03E-01	7.33E-09	4.45E-10	0.005	8.90E-08	1.47E-09	8.90E-11	4.3	3.83E-10
Cadmium	1.43E+01	7.33E-09	2.10E-08	0.001	2.10E-05	1.47E-09	4.21E-09		
Cobalt	4.86E+00	7.33E-09	7.13E-09	0.06	1.19E-07	1.47E-09	1.43E-09		
Lead	1.79E+01	7.33E-09	2.63E-08			1.47E-09	5.26E-09		
Mercury	1.25E-01	7.33E-09	1.84E-10	0.0003	6.13E-07	1.47E-09	3.68E-11		
Nickel	5.40E+01	7.33E-09	7.92E-08	0.02	3.96E-06	1.47E-09	1.58E-08		
Silver	2.54E+00	7.33E-09	3.73E-09	0.005	7.46E-07	1.47E-09	7.46E-10		
Thallium	9.01E-01	7.33E-09	1.32E-09	0.00008	1.65E-05	1.47E-09	2.64E-10		
Vanadium	1.79E+01	7.33E-09	2.62E-08	0.007	3.74E-06	1.47E-09	5.24E-09		
PCBs/Pesticides									
Aldrin	1.18E-02	7.33E-08	1.72E-10	0.00003	5.75E-06	1.47E-08	3.45E-11	17	5.86E-10
alpha-BHC	2.00E-03	7.33E-08	2.93E-11			1.47E-08	5.87E-12	6.3	3.70E-11
alpha-Chlordane	4.13E-02	7.33E-08	6.06E-10	0.00006	1.01E-05	1.47E-08	1.21E-10	1.3	1.58E-10
Aroclor 1254	7.21E-01	7.33E-08	1.06E-08	0.00002	5.29E-04	1.47E-08	2.11E-09		
Heptachlor	7.98E-02	7.33E-08	1.17E-09	0.0005	2.34E-06	1.47E-08	2.34E-10	4.5	1.05E-09
Semivolatile organics									
1-Chloronaphthalene	1.30E+00	7.33E-08	1.91E-08	0.03	6.36E-07	1.47E-08	3.81E-09		
2-Chloronaphthalene	6.90E-02	7.33E-08	1.01E-09	0.08	1.26E-08	1.47E-08	2.02E-10		
2-Methylnaphthalene	1.10E-01	7.33E-08	1.61E-09	0.03	5.38E-08	1.47E-08	3.23E-10		
3/4-Methylphenol	1.60E-01	7.33E-08	2.35E-09	0.05	4.69E-08	1.47E-08	4.69E-10		
Acenaphthene	2.20E-01	7.33E-08	3.23E-09	0.06	5.38E-08	1.47E-08	6.45E-10		
Anthracene	1.51E-01	7.33E-08	2.22E-09	0.3	7.39E-09	1.47E-08	4.43E-10		
Benzo(a)anthracene	1.70E-01	7.33E-08	2.49E-09			1.47E-08	4.98E-10	0.73	3.64E-10
Benzo(a)pyrene	1.84E-01	7.33E-08	2.70E-09			1.47E-08	5.40E-10	7.3	3.94E-09
Benzo(b)fluoranthene	2.15E-01	7.33E-08	3.15E-09			1.47E-08	6.31E-10	0.73	4.61E-10
Benzo(g,h,i)perylene	1.63E-01	7.33E-08	2.39E-09	0.03	7.97E-08	1.47E-08	4.78E-10		
Benzo(k)fluoranthene	1.49E-01	7.33E-08	2.18E-09			1.47E-08	4.37E-10	0.073	3.19E-11
bis(2-Ethylhexyl)phthalate	5.98E-01	7.33E-08	8.77E-09			1.47E-08	1.75E-09	0.014	2.46E-11
Chrysene	1.95E-01	7.33E-08	2.85E-09			1.47E-08	5.71E-10	0.0073	4.17E-12
Di-n-butyl phthalate	3.40E-02	7.33E-08	4.99E-10	0.1	4.99E-09	1.47E-08	9.97E-11		
Di-n-octyl phthalate	7.70E-02	7.33E-08	1.13E-09	0.02	5.65E-08	1.47E-08	2.26E-10		
Dibenzofuran	2.06E-01	7.33E-08	3.02E-09	0.004	7.55E-07	1.47E-08	6.04E-10		
Fluoranthene	4.38E-01	7.33E-08	6.43E-09	0.04	1.61E-07	1.47E-08	1.29E-09		
Indeno(1,2,3-cd)pyrene	1.60E-01	7.33E-08	2.34E-09			1.47E-08	4.68E-10	0.73	3.42E-10
Phenanthrene	2.72E-01	7.33E-08	3.99E-09	0.03	1.33E-07	1.47E-08	7.98E-10		
Pyrene	3.11E-01	7.33E-08	4.57E-09	0.03	1.52E-07	1.47E-08	9.13E-10		
Volatile Oragnics									
2-Butanone (MEK)	1.01E-02	7.33E-08	1.48E-10	0.6	2.47E-10	1.47E-08	2.97E-11		
Acetone	2.40E-02	7.33E-08	3.52E-10	0.1	3.52E-09	1.47E-08	7.04E-11		
Acrylonitrile	4.50E-03	7.33E-08	6.60E-11	0.00003	2.20E-06	1.47E-08	1.32E-11	17	2.24E-10
Carbon disulfide	6.77E-03	7.33E-08	9.93E-11	0.1	9.93E-10	1.47E-08	1.99E-11		
Chlorobenzene	3.64E-03	7.33E-08	5.34E-11	0.02	2.67E-09	1.47E-08	1.07E-11		
Methylene chloride	3.85E-03	7.33E-08	5.65E-11	0.06	9.41E-10	1.47E-08	1.13E-11	0.0075	8.47E-14
Toluene	4.61E-02	7.33E-08	6.76E-10	0.2	3.38E-09	1.47E-08	1.35E-10		
				HAZARD INDEX =	6.12E-04			TOTAL CANCER RISK =	7.61E-09

TABLE A-42

TINKER AFB SITE - OFF-BASE EAST SOLDIER CREEK (AREA 4)
DERMAL EXPOSURE TO CHEMICALS IN SEDIMENTS DUE TO WADING AND SWIMMING
OFF-BASE CHILD AND ADULT RESIDENT - RME
(FUTURE USE SCENARIO)

Equation HIF = {[(SAc x EFc x EDc x ABS) / BWc + (SAa x EFa x EDa x ABS) / BWa] x CF} / (AT1 x AT2)
CDI = CS x AF x HIF
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
HIF = Human Intake Factor
CDI = Chronic Daily Intake
CS = Concentration in Sediments
SAc = Child Skin Surface Area Available for Contact = 6,500 cm^2
EFc = Child Exposure Frequency = 34 days per year
EDc = Child Exposure Duration = 5 years
BWc = Child Body Weight = 15.1 kg
SAa = Adult Skin Surface Area Available for Contact = 8,600 cm^2
EFa = Adult Exposure Frequency = 4 days per year
EDa = Adult Exposure Duration = 25 years
BW = AdultBody Weight = 57.1 kg
AF = Adherence Factor = 1.0% for organics and 0.1% for inorganics
ABS = Absorption Factor = 1.0
AT1 = Days Per Year = 365 days/year
AT2 = Averaging Time (70 years for carcinogenic effects, 30 years for non-carcinogenic effects)
CF = Conversion Factor = 0.000001 kg/mg
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CS (mg/kg)	NON-CANCER HIF (mg/kg-dy)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER HIF (mg/kg-dy)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)$^{-1}$	CANCER RISK (unitless)
Metals									
Antimony	3.82E+00	8.06E-09	3.08E-08	0.0004	7.70E-05	3.45E-09	1.32E-08		
Beryllium	4.78E-01	8.06E-09	3.85E-09	0.005	7.70E-07	3.45E-09	1.65E-09	4.3	7.10E-09
Cadmium	1.23E+02	8.06E-09	9.92E-07	0.001	9.92E-04	3.45E-09	4.25E-07		
Cobalt	5.85E+00	8.06E-09	4.72E-08	0.06	7.86E-07	3.45E-09	2.02E-08		
Lead	3.75E+01	8.06E-09	3.02E-07			3.45E-09	1.29E-07		
Mercury	1.64E-01	8.06E-09	1.32E-09	0.0003	4.41E-06	3.45E-09	5.67E-10		
Nickel	1.21E+02	8.06E-09	9.79E-07	0.02	4.90E-05	3.45E-09	4.20E-07		
Silver	4.95E+00	8.06E-09	3.99E-08	0.005	7.99E-06	3.45E-09	1.71E-08		
Thallium	1.09E+00	8.06E-09	8.78E-09	0.00008	1.10E-04	3.45E-09	3.76E-09		
Vanadium	2.03E+01	8.06E-09	1.64E-07	0.007	2.34E-05	3.45E-09	7.01E-08		
PCBs/Pesticides									
Aldrin	4.01E-02	8.06E-08	3.24E-09	0.00003	1.08E-04	3.45E-08	1.39E-09	17	2.36E-08
alpha-BHC	2.00E-03	8.06E-08	1.61E-10			3.45E-08	6.91E-11	6.3	4.35E-10
alpha-Chlordane	7.48E-02	8.06E-08	6.03E-09	0.00006	1.00E-04	3.45E-08	2.58E-09	1.3	3.36E-09
Aroclor 1254	9.70E+00	8.06E-08	7.82E-07	0.00002	3.91E-02	3.45E-08	3.35E-07		
Heptachlor	9.70E-01	8.06E-08	7.82E-08	0.0005	1.56E-04	3.45E-08	3.35E-08	4.5	1.51E-07
Semivolatile organics									
1-Chloronaphthalene	1.30E+00	8.06E-08	1.05E-07	0.03	3.49E-06	3.45E-08	4.49E-08		
2-Chloronaphthalene	6.90E-02	8.06E-08	5.56E-09	0.08	6.95E-08	3.45E-08	2.38E-09		
2-Methylnaphthalene	1.10E-01	8.06E-08	8.87E-09	0.03	2.96E-07	3.45E-08	3.80E-09		
3/4-Methylphenol	1.60E-01	8.06E-08	1.29E-08	0.05	2.58E-07	3.45E-08	5.53E-09		
Acenaphthene	2.41E-01	8.06E-08	1.94E-08	0.06	3.24E-07	3.45E-08	8.33E-09		
Anthracene	5.34E-01	8.06E-08	4.31E-08	0.3	1.44E-07	3.45E-08	1.85E-08		
Benzo(a)anthracene	5.78E-01	8.06E-08	4.66E-08			3.45E-08	2.00E-08	0.73	1.46E-08
Benzo(a)pyrene	6.57E-01	8.06E-08	5.30E-08			3.45E-08	2.27E-08	7.3	1.66E-07
Benzo(b)fluoranthene	7.20E-01	8.06E-08	5.80E-08			3.45E-08	2.49E-08	0.73	1.82E-08
Benzo(g,h,i)perylene	6.00E-01	8.06E-08	4.84E-08	0.03	1.61E-06	3.45E-08	2.07E-08		
Benzo(k)fluoranthene	5.51E-01	8.06E-08	4.44E-08			3.45E-08	1.90E-08	0.073	1.39E-09
bis(2-Ethylhexyl)phthalate	4.50E+00	8.06E-08	3.63E-07			3.45E-08	1.55E-07	0.014	2.18E-09
Chrysene	6.10E-01	8.06E-08	4.92E-08			3.45E-08	2.11E-08	0.0073	1.54E-10
Di-n-butyl phthalate	3.40E-02	8.06E-08	2.74E-09	0.1	2.74E-08	3.45E-08	1.17E-09		
Di-n-octyl phthalate	7.70E-02	8.06E-08	6.21E-09	0.02	3.10E-07	3.45E-08	2.66E-09		
Dibenzofuran	2.13E-01	8.06E-08	1.71E-08	0.004	4.29E-06	3.45E-08	7.35E-09		
Fluoranthene	1.67E+00	8.06E-08	1.35E-07	0.04	3.37E-06	3.45E-08	5.77E-08		
Indeno(1,2,3-cd)pyrene	6.30E-01	8.06E-08	5.08E-08			3.45E-08	2.18E-08	0.73	1.59E-08
Phenanthrene	6.93E-01	8.06E-08	5.59E-08	0.03	1.86E-06	3.45E-08	2.39E-08		
Pyrene	2.59E+00	8.06E-08	2.09E-07	0.03	6.97E-06	3.45E-08	8.96E-08		
Volatile Oragnics									
2-Butanone (MEK)	1.28E-02	8.06E-08	1.03E-09	0.6	1.72E-09	3.45E-08	4.42E-10		
Acetone	3.98E-02	8.06E-08	3.21E-09	0.1	3.21E-08	3.45E-08	1.38E-09		
Acrylonitrile	4.50E-03	8.06E-08	3.63E-10	0.00003	1.21E-05	3.45E-08	1.55E-10	17	2.64E-09
Carbon disulfide	9.47E-03	8.06E-08	7.63E-10	0.1	7.63E-09	3.45E-08	3.27E-10		
Chlorobenzene	7.00E-03	8.06E-08	5.64E-10	0.02	2.82E-08	3.45E-08	2.42E-10		
Methylene chloride	6.95E-03	8.06E-08	5.60E-10	0.06	9.33E-09	3.45E-08	2.40E-10	0.0075	1.80E-12
Toluene	1.89E-01	8.06E-08	1.52E-08	0.2	7.61E-08	3.45E-08	6.52E-09		
				HAZARD INDEX =	4.08E-02			TOTAL CANCER RISK =	4.06E-07

TABLE A-43

TINKER AFB SITE - OFF-BASE EAST SOLDIER CREEK (AREA 4)
DERMAL EXPOSURE TO CHEMICALS IN SEDIMENTS DUE TO WADING AND SWIMMING
OFF-BASE CHILD AND ADULT RESIDENT - AVERAGE EXPOSURE
(CURRENT USE SCENARIO)

Equation HIF = {[(SAc x EFc x EDc x ABS) / BWc + (SAa x EFa x EDa x ABS) / BWa] x CF} / (AT1 x AT2)
CDI = CS x AF x HIF
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
HIF = Human Intake Factor
CDI = Chronic Daily Intake
CS = Concentration in Sediments
SAc = Child Skin Surface Area Available for Contact = 6,500 cm^2
EFc = Child Exposure Frequency = 17 days per year
EDc = Child Exposure Duration = 5 years
BWc = Child Body Weight = 15.1 kg
SAa = Adult Skin Surface Area Available for Contact = 2,800 cm^2
EFa = Adult Exposure Frequency = 2 days per year
EDa = Adult Exposure Duration = 9 years
BW = AdultBody Weight = 57.1 kg
AF = Adherence Factor = 1.0% for organics and 0.1% for inorganics
ABS = Absorption Factor = 0.2
AT1 = Days Per Year = 365 days/year
AT2 = Averaging Time (70 years for carcinogenic effects, 14 years for non-carcinogenic effects)
CF = Conversion Factor = 0.000001 kg/mg
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CS (mg/kg)	NON-CANCER HIF (mg/kg-dy)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER HIF (mg/kg-dy)	CANCER CDI (mg/kg-dy)	SF (mg/kg-dy)$^{-1}$	CANCER RISK (unitless)
Metals									
Antimony	3.76E+00	7.33E-09	5.51E-09	0.0004	1.38E-05	1.47E-09	1.10E-09		
Beryllium	2.66E-01	7.33E-09	3.89E-10	0.005	7.79E-08	1.47E-09	7.79E-11	4.3	3.35E-10
Cadmium	2.79E+01	7.33E-09	4.09E-08	0.001	4.09E-05	1.47E-09	8.19E-09		
Cobalt	4.73E+00	7.33E-09	6.94E-09	0.06	1.16E-07	1.47E-09	1.39E-09		
Lead	2.50E+01	7.33E-09	3.67E-08			1.47E-09	7.34E-09		
Mercury	1.57E-01	7.33E-09	2.30E-10	0.0003	7.66E-07	1.47E-09	4.60E-11		
Nickel	9.91E+01	7.33E-09	1.45E-07	0.02	7.26E-06	1.47E-09	2.91E-08		
Silver	4.57E+00	7.33E-09	6.71E-09	0.005	1.34E-06	1.47E-09	1.34E-09		
Thallium	3.44E-01	7.33E-09	5.04E-10	0.00008	6.30E-06	1.47E-09	1.01E-10		
Vanadium	1.72E+01	7.33E-09	2.52E-08	0.007	3.59E-06	1.47E-09	5.03E-09		
PCBs/Pesticides									
Aldrin	1.02E-02	7.33E-08	1.49E-10	0.00003	4.97E-06	1.47E-08	2.98E-11	17	5.07E-10
alpha-BHC	1.44E+00	7.33E-08	2.11E-08			1.47E-08	4.23E-09	6.3	2.66E-08
alpha-Chlordane	8.23E-03	7.33E-08	1.21E-10	0.00006	2.01E-06	1.47E-08	2.41E-11	1.3	3.14E-11
Aroclor 1254	9.04E-03	7.33E-08	1.33E-10	0.00002	6.63E-06	1.47E-08	2.65E-11		
Heptachlor	1.98E-01	7.33E-08	2.91E-09	0.0005	5.82E-06	1.47E-08	5.82E-10	4.5	2.62E-09
Semivolatile organics									
1-Chloronaphthalene	1.54E+00	7.33E-08	2.25E-08	0.03	7.51E-07	1.47E-08	4.50E-09		
2-Chloronaphthalene	1.83E-01	7.33E-08	2.69E-09	0.08	3.36E-08	1.47E-08	5.38E-10		
2-Methylnaphthalene	1.94E-01	7.33E-08	2.84E-09	0.03	9.46E-08	1.47E-08	5.68E-10		
3/4-Methylphenol	2.31E-01	7.33E-08	3.38E-09	0.05	6.77E-08	1.47E-08	6.77E-10		
Acenaphthene	2.55E-01	7.33E-08	3.74E-09	0.06	6.23E-08	1.47E-08	7.48E-10		
Anthracene	2.26E-01	7.33E-08	3.32E-09	0.3	1.11E-08	1.47E-08	6.63E-10		
Benzo(a)anthracene	2.60E-01	7.33E-08	3.82E-09			1.47E-08	7.64E-10	0.73	5.57E-10
Benzo(a)pyrene	2.47E-01	7.33E-08	3.62E-09			1.47E-08	7.25E-10	7.3	5.29E-09
Benzo(b)fluoranthene	3.51E-01	7.33E-08	5.15E-09			1.47E-08	1.03E-09	0.73	7.53E-10
Benzo(g,h,i)perylene	2.05E-01	7.33E-08	3.01E-09	0.03	1.00E-07	1.47E-08	6.01E-10		
Benzo(k)fluoranthene	1.67E-01	7.33E-08	2.45E-09			1.47E-08	4.90E-10	0.073	3.58E-11
bis(2-Ethylhexyl)phthalate	8.23E-01	7.33E-08	1.21E-08			1.47E-08	2.41E-09	0.014	3.38E-11
Chrysene	3.18E-01	7.33E-08	4.66E-09			1.47E-08	9.32E-10	0.0073	6.80E-12
Di-n-butyl phthalate	1.86E-01	7.33E-08	2.73E-09	0.1	2.73E-08	1.47E-08	5.46E-10		
Di-n-octyl phthalate	2.15E-01	7.33E-08	3.15E-09	0.02	1.58E-07	1.47E-08	6.30E-10		
Dibenzofuran	2.16E-01	7.33E-08	3.17E-09	0.004	7.94E-07	1.47E-08	6.35E-10		
Fluoranthene	7.17E-01	7.33E-08	1.05E-08	0.04	2.63E-07	1.47E-08	2.10E-09		
Indeno(1,2,3-cd)pyrene	2.08E-01	7.33E-08	3.06E-09			1.47E-08	6.11E-10	0.73	4.46E-10
Phenanthrene	6.13E-01	7.33E-08	8.99E-09	0.03	3.00E-07	1.47E-08	1.80E-09		
Pyrene	4.89E-01	7.33E-08	7.17E-09	0.03	2.39E-07	1.47E-08	1.43E-09		
Volatile Oragnics									
2-Butanone (MEK)	1.93E-02	7.33E-08	2.83E-10	0.6	4.71E-10	1.47E-08	5.66E-11		
Acetone	1.12E-01	7.33E-08	1.65E-09	0.1	1.65E-08	1.47E-08	3.29E-10		
Acrylonitrile	7.93E-03	7.33E-08	1.16E-10	0.00003	3.88E-06	1.47E-08	2.33E-11	17	3.95E-10
Carbon disulfide	5.94E-03	7.33E-08	8.72E-11	0.1	8.72E-10	1.47E-08	1.74E-11		
Chlorobenzene	6.73E-03	7.33E-08	9.88E-11	0.02	4.94E-09	1.47E-08	1.98E-11		
Methylene chloride	1.24E-01	7.33E-08	1.82E-09	0.06	3.04E-08	1.47E-08	3.65E-10	0.0075	2.73E-12
Toluene	1.08E-02	7.33E-08	1.59E-10	0.2	7.95E-10	1.47E-08	3.18E-11		
				HAZARD INDEX =	1.00E-04			TOTAL CANCER RISK =	3.77E-08

TABLE A-44

TINKER AFB SITE - OFF-BASE EAST SOLDIER CREEK (AREA 4)
DERMAL EXPOSURE TO CHEMICALS IN SEDIMENTS DUE TO WADING AND SWIMMING
OFF-BASE CHILD AND ADULT RESIDENT - RME
(CURRENT USE SCENARIO)

Equation HIF = {[(SAc x EFc x EDc x ABS) / BWc + (SAa x EFa x EDa x ABS) / BWa] x CF} / (AT1 x AT2)
CDI = CS x AF x HIF
Hazard Quotient = CDI / RfD
Cancer Risk = CDI x Slope Factor

Where:
HIF = Human Intake Factor
CDI = Chronic Daily Intake
CS = Concentration in Sediments
SAc = Child Skin Surface Area Available for Contact = 6,500 cm^2
EFc = Child Exposure Frequency = 34 days per year
EDc = Child Exposure Duration = 5 years
BWc = Child Body Weight = 15.1 kg
SAa = Adult Skin Surface Area Available for Contact = 8,600 cm^2
EFa = Adult Exposure Frequency = 4 days per year
EDa = Adult Exposure Duration = 25 years
BW = AdultBody Weight = 57.1 kg
AF = Adherence Factor = 1.0% for organics and 0.1% for inorganics
ABS = Absorption Factor = 1.0
AT1 = Days Per Year = 365 days/year
AT2 = Averaging Time (70 years for carcinogenic effects, 30 years for non-carcinogenic effects)
CF = Conversion Factor = 0.000001 kg/mg
SF = Slope Factor
RfD = Reference Dose

CHEMICALS OF CONCERN	CS (mg/kg)	NON-CANCER HIF (mg/kg-dy)	NON-CANCER CDI (mg/kg-dy)	RfD (mg/kg-dy)	HAZARD QUOTIENT (unitless)	CANCER HIF (mg/kg-dy)	CANCER CDI (mg/kg-dy)	SF $(mg/kg\text{-}dy)^{-1}$	CANCER RISK (unitless)
Metals									
Antimony	3.94E+00	8.06E-09	3.18E-08	0.0004	7.95E-05	3.45E-09	1.36E-08		
Beryllium	4.60E-01	8.06E-09	3.71E-09	0.005	7.42E-07	3.45E-09	1.59E-09	4.3	6.83E-09
Cadmium	1.23E+02	8.06E-09	9.92E-07	0.001	9.92E-04	3.45E-09	4.25E-07		
Cobalt	6.75E+00	8.06E-09	5.44E-08	0.06	9.07E-07	3.45E-09	2.33E-08		
Lead	7.48E+01	8.06E-09	6.03E-07			3.45E-09	2.58E-07		
Mercury	6.00E-01	8.06E-09	4.84E-09	0.0003	1.61E-05	3.45E-09	2.07E-09		
Nickel	3.26E+02	8.06E-09	2.63E-06	0.02	1.31E-04	3.45E-09	1.13E-06		
Silver	1.62E+01	8.06E-09	1.31E-07	0.005	2.61E-05	3.45E-09	5.60E-08		
Thallium	6.00E-01	8.06E-09	4.84E-09	0.00008	6.05E-05	3.45E-09	2.07E-09		
Vanadium	2.34E+01	8.06E-09	1.89E-07	0.007	2.70E-05	3.45E-09	8.10E-08		
PCBs/Pesticides									
Aldrin	5.00E-02	8.06E-08	4.03E-09	0.00003	1.34E-04	3.45E-08	1.73E-09	17	2.94E-08
alpha-BHC	9.70E+00	8.06E-08	7.82E-07			3.45E-08	3.35E-07	6.3	2.11E-06
alpha-Chlordane	5.00E-02	8.06E-08	4.03E-09	0.00006	6.72E-05	3.45E-08	1.73E-09	1.3	2.25E-09
Aroclor 1254	5.00E-02	8.06E-08	4.03E-09	0.00002	2.02E-04	3.45E-08	1.73E-09		
Heptachlor	9.70E-01	8.06E-08	7.82E-08	0.0005	1.56E-04	3.45E-08	3.35E-08	4.5	1.51E-07
Semivolatile organics									
1-Chloronaphthalene	1.65E+00	8.06E-08	1.33E-07	0.03	4.44E-06	3.45E-08	5.71E-08		
2-Chloronaphthalene	4.05E-01	8.06E-08	3.26E-08	0.08	4.08E-07	3.45E-08	1.40E-08		
2-Methylnaphthalene	2.30E-01	8.06E-08	1.85E-08	0.03	6.18E-07	3.45E-08	7.95E-09		
3/4-Methylphenol	2.97E-01	8.06E-08	2.40E-08	0.05	4.79E-07	3.45E-08	1.03E-08		
Acenaphthene	3.58E-01	8.06E-08	2.88E-08	0.06	4.81E-07	3.45E-08	1.24E-08		
Anthracene	7.90E-01	8.06E-08	6.37E-08	0.3	2.12E-07	3.45E-08	2.73E-08		
Benzo(a)anthracene	1.50E+00	8.06E-08	1.21E-07			3.45E-08	5.18E-08	0.73	3.78E-08
Benzo(a)pyrene	1.30E+00	8.06E-08	1.05E-07			3.45E-08	4.49E-08	7.3	3.28E-07
Benzo(b)fluoranthene	2.30E+00	8.06E-08	1.85E-07			3.45E-08	7.95E-08	0.73	5.80E-08
Benzo(g,h,i)perylene	6.00E-01	8.06E-08	4.84E-08	0.03	1.61E-06	3.45E-08	2.07E-08		
Benzo(k)fluoranthene	4.05E-01	8.06E-08	3.26E-08			3.45E-08	1.40E-08	0.073	1.02E-09
bis(2-Ethylhexyl)phthalate	3.00E+00	8.06E-08	2.42E-07			3.45E-08	1.04E-07	0.014	1.45E-09
Chrysene	2.10E+00	8.06E-08	1.69E-07			3.45E-08	7.26E-08	0.0073	5.30E-10
Di-n-butyl phthalate	4.05E-01	8.06E-08	3.26E-08	0.1	3.26E-07	3.45E-08	1.40E-08		
Di-n-octyl phthalate	4.05E-01	8.06E-08	3.26E-08	0.02	1.63E-06	3.45E-08	1.40E-08		
Dibenzofuran	2.38E-01	8.06E-08	1.92E-08	0.004	4.80E-06	3.45E-08	8.24E-09		
Fluoranthene	4.40E+00	8.06E-08	3.55E-07	0.04	8.87E-06	3.45E-08	1.52E-07		
Indeno(1,2,3-cd)pyrene	6.30E-01	8.06E-08	5.08E-08			3.45E-08	2.18E-08	0.73	1.59E-08
Phenanthrene	4.60E+00	8.06E-08	3.71E-07	0.03	1.24E-05	3.45E-08	1.59E-07		
Pyrene	3.60E+00	8.06E-08	2.90E-07	0.03	9.67E-06	3.45E-08	1.24E-07		
Volatile Oragnics	0.00E+00								
2-Butanone (MEK)	6.96E-02	8.06E-08	5.61E-09	0.6	9.35E-09	3.45E-08	2.41E-09		
Acetone	7.00E-01	8.06E-08	5.64E-08	0.1	5.64E-07	3.45E-08	2.42E-08		
Acrylonitrile	2.67E-02	8.06E-08	2.15E-09	0.00003	7.17E-05	3.45E-08	9.22E-10	17	1.57E-08
Carbon disulfide	3.50E-02	8.06E-08	2.82E-09	0.1	2.82E-08	3.45E-08	1.21E-09		
Chlorobenzene	3.50E-02	8.06E-08	2.82E-09	0.02	1.41E-07	3.45E-08	1.21E-09		
Methylene chloride	1.10E+00	8.06E-08	8.87E-08	0.06	1.48E-06	3.45E-08	3.80E-08	0.0075	2.85E-10
Toluene	1.08E-02	8.06E-08	8.74E-10	0.2	4.37E-09	3.45E-08	3.75E-10		
				HAZARD INDEX =	2.01E-03			TOTAL CANCER RISK =	2.76E-06

APPENDIX B

SUPPORTING TABLES

APPENDIX B - SUPPORTING TABLES

TABLE B-1
FIRST QUARTER SEDIMENT SAMPLING DETECTIONS
0-6 inches (bgs), November 1994

	East Soldier Creek												West Soldier Creek					
	QE01	**QE02**	**QE03**	**QE04**	**QE05**	**QE06**	**QE07**	**QE08**	**QE09**	**QE10**	**QE11**	**TR01**	**QW01**	**QW02**	**QW03**	**QW04**	**QW05**	**QW06**
Inorganics (mg/kg)																		
Aluminum	2040	687	1010	1770	1450	2680	2340	14100	2210	4370	3860	6180	13100	13500	4520	10900	2140	9910
Barium	927	422	1850	329	536	578	114	695	211	348	785	299	364	395	153	347	3850	733
Beryllium						0.26		0.96		0.37	0.25	0.47	1.1	0.92	0.39	0.71		0.79
Cadmium	1.6	1	2.6	1.6	6.1	3.9	4.3	63.6	16.2	7.8	123		6.1	4.6	1.5	43.3	2.2	
Calcium	144000	117000	91000	181000	80700	62800	125000	33100	51100	768	37300	1140	8040	19400	8160	28100	86100	15500
Chromium	72.2	34.6	691	23.2	65.9	51.3	59.9	307	268	44.8	606	25.5	63.7	88.8	23.4	820	58.1	21
Cobalt		3.9	6	3.2	2.7	4.7	3.8	12.4	12.3	2.8	5.8	4.5	11.7	9.7	6.3	42.1	4	6.5
Copper	12.1	79.3	413	29.7	40.6	37.4	32	541	78.7	3.3	40.4	5	15.5	36.4	11	172	14.6	9.8
Iron	3320	2690	9360	8100	4220	6260	17500	19000	5290	9120	11300	10700	15600	16300	11500	13100	9190	13900
Lead	318	14.4	53	20.2	73.3	36.7	52.7	131	41.2	6.5	74.8	7.8	73	69.7	10.7	196	34.8	22.2
Magnesium	3730	4590	5120	11600	2860	22800	6030	5790	1800	972	13300	1020	5480	5470	5020	4130	8940	8540
Manganese	145	120	152	515	149	307	185	248	229	104	890	189	845	283	498	406	312	372
Molybdenum		1.7	7.1		0.72			19.1	3.4		6.5	0.88	1.3	9.3	6.8	23.8	2.5	1.3
Nickel	5.7	154	116	8.3	76.3	21.4	24.7	88.4	52.1	7.2	326	8.6	19.1	119	508	704	15	15.9
Potassium	263	159	198	349	241	371	340	1790	358	731	525	880	1620	2030	915	1480	353	1650
Silver			1.7				9.7	6.7	2.9		14			4.7	3.5	64.6	1.4	
Sodium								1090	245	163	666		290	563	86	1890	255	228
Vanadium	6.5	6.3	22.1	12.5	10.8	15.8	9.2	48.7	15.7	16.8	17.7	18	27	33	18.4	41.1	10.2	26.7
Zinc	135	84.8	257	69.1	144	107	103	492	83.8	17.3	268	14.9	64.6	232	32.7	668	120	33.4
Arsenic	1.7	1.1	1.6	1.3	1.1	2.3	1.5	3.6	5.1	1.8	7.5	2.8	3.1	1.9	0.51	3.9	2.8	3.6
Mercury			0.55	0.19				0.3	0.27		0.13					0.32		
Selenium			0.68						0.39						0.2	3.4		0.14
Thallium								0.38				0.0018	0.2			0.16		
Pesticides and PCBs (ug/kg)																		
Aldrin					8.2	17	57				11					9.4	45	
alpha-Chlordane																		
Aroclor 1254		8300	3400	840	510	570		5200	340		550			68	3900	1000	1700	
delta-BHC							34											1.2
Endrin	2																	
Heptachlor						6.8	120	180										
Methoxychlor	19																	
Volatile Organics (ug/kg)																		
1,1,2,2-Tetrachloroethane	2.5		2.6															
1,2,3-Trichloropropane	1.7																	
2-Butanone (MEK)									4.3		3.8	2		6.9		5.3		
Acetone			8.3	2.5		13		100	24	9.5	20	17		36	55	48		11
Acrylonitrile											4.5							

TABLE B-1
FIRST QUARTER SEDIMENT SAMPLING DETECTIONS
0-6 inches (bgs), November 1994

	East Soldier Creek												West Soldier Creek					
	QE01	QE02	QE03	QE04	QE05	QE06	QE07	QE08	QE09	QE10	QE11	TR01	QW01	QW02	QW03	QW04	QW05	QW06
Benzene																		
Carbon disulfide											5.4				11			
Chlorobenzene									41							3.2		
Chloromethane			1.8															
Ethylbenzene								3.3										
Methylene chloride	3	2.7	2.2	3.4	10	7.3	3.6		6.9	6.4	8.4	4.1	2.3	6.5	24	3.4	3.5	3
Tetrachloroethene		1.4														7.9		
Toluene						2	2.7						1.9		12	1.9		2.2
trans-1,4-Dichloro-^2-butene	1.2																	
Trichloroethene																16		
Vinyl chloride																		
Xylenes (total)																		
Semivolatile Organics (ug/kg)																		
1,2-Dichlorobenzene																340		
1,4-Dichlorobenzene																60		
1-Chloronaphthalene							250											
2,4-Dimethylphenol													84			75		
2-Chloronaphthalene																		
2-Methylnaphthalene	110						73									79		
3/4-Methylphenol													46			88		
Acenaphthene						97	410	270								270		
Acetophenone																		
Anthracene	130	75				250	650	830						77	120	580		
Benzidine																		
Benzo(a)anthracene	2900	1100	130	42	81	1100	1100	2200	250		41			560	110	2700	360	
Benzo(a)pyrene	2200	930	210		84	920	830	2200	260					660		2600	430	
Benzo(b)fluoranthene	6100	2100	430	140	180	2000	1600	4400	460				69	760	160	2600	920	
Benzo(g,h,i)perylene	1500	630				140	500	1200	170					500		1800	270	
Benzo(k)fluoranthene											48			690		2400		
Benzoic acid		48	170	41										71				
bis(2-Ethylhexyl)^phthalate	6300	660	830	250	180	220	700	2500	7000		1300			230	610	2100	440	
Butyl benzyl phthalate	430				6000			98							370	180		
Chrysene	5200	1100	200	93	130	1200	1200	2800	380		75		45	850	190	3000	1100	
Di-n-butyl phthalate																150		
Di-n-octyl phthalate									410		49					93		
Dibenz(a,h)anthracene							54									750	120	
Dibenzofuran							250	190								160		
Fluoranthene	6400	910	320	140	270	2600	2500	5900	1300		920		44	1200	420	5700	620	

TABLE B-1
FIRST QUARTER SEDIMENT SAMPLING DETECTIONS
0-6 inches (bgs), November 1994

	East Soldier Creek												West Soldier Creek					
	QE01	QE02	QE03	QE04	QE05	QE06	QE07	QE08	QE09	QE10	QE11	TR01	QW01	QW02	QW03	QW04	QW05	QW06
Fluorene						92	410	360							150	290		
Indeno(1,2,3-cd)pyrene	1500	600					440	1100	160					430		1700	240	
Naphthalene						85	1000	160								170		
Phenanthrene	1300	230	160	59	150	2000	2500	3600	280					590	1200	3800	150	
Pyrene	7800	1300	480	220	260	3200	2800	5400	710		140		44	1200	250	5500	520	

TABLE B-2
FIRST QUARTER SEDIMENT SAMPLING DETECTIONS
6-12 inches (bgs), November 1994

	East Soldier Creek							West Soldier Creek		
	QE06	QE07	QE08	QE09	QE10	QE11	TR01	QW01	QW02	QW04
Inorganics (mg/kg)										
Aluminum	2300	4450	7860	1450	5540	3470	8000	16400	6860	10800
Barium	476	125	467	152	362	1010	464	220	185	442
Beryllium	0.25		0.59		0.46	0.27	0.55	1.3	0.64	0.86
Cadmium	3.8	5.8	328	9.4	3.6	104		2	2	74.8
Calcium	51400	132000	6720	35400	1620	37000	1160	18900	34400	11800
Chromium	24.2	46.1	627	153	31.7	831	14.1	44.3	67.3	1350
Cobalt	4.5	2.6	14.1	6.5	4.2	6.1	5.2	12.3	7.3	35.7
Copper	31.6	168	85.7	34.7	3.2	33.9	2.6	25.2	10.7	120
Iron	5290	26600	10200	3380	10700	10100	12500	18400	8080	14300
Lead	27	42.6	184	16.9	8.4	107	6.6	26.4	20.8	172
Magnesium	12200	3510	2240	1430	1120	12100	1190	13600	15200	2980
Manganese	868	182	301	158	129	902	210	965	930	729
Molybdenum	1.2		4.5	2.3	0.71	7.2	0.78	0.73	2.6	26
Nickel	12.2	21.3	135	50.2	7.9	347	8.7	25.9	56.9	1090
Potassium	295	278	948	259	897	479	1090	2910	997	1290
Silver		1.5	13.5	1.9		19.4	0.4		0.83	79.4
Sodium			556		75.9	328		303	202	819
Vanadium	16.3	9.2	23.7	9.4	18.3	19.9	19	23.6	58.7	43.3
Zinc	57.7	76.4	283	51.8	15.1	122	14.1	56.1	60.7	372
Arsenic	1.4	0.99	4.6	7.5	2.4	5.5	3.3	2	0.73	3.8
Mercury			0.18			0.3				0.094
Selenium						0.31				4.2
Thallium					0.15		0.19			
Pesticides and PCBs (ug/kg)										
Aldrin			53	5.6		86				11
alpha-Chlordane						910				
Aroclor 1254	970		5200	200		2000			38	1500
delta-BHC		370								
Endrin										
Heptachlor		820								
Methoxychlor										
Volatile Organics (ug/kg)										
1,1,2,2-Tetrachloroethane										
1,2,3-Trichloropropane										

TABLE B-2
FIRST QUARTER SEDIMENT SAMPLING DETECTIONS
6-12 inches (bgs), November 1994

	East Soldier Creek							West Soldier Creek		
	QE06	QE07	QE08	QE09	QE10	QE11	TR01	QW01	QW02	QW04
2-Butanone (MEK)			12		3.6	12			9.4	
Acetone		6.1	62	39	18	60	19	4.6	42	19
Acrylonitrile										
Benzene			2.2							
Carbon disulfide				1.5		15				
Chlorobenzene			940	44		1.9				13
Chloromethane										
Ethylbenzene			2.3							
Methylene chloride	12	3	7.4	14	5.2	7.4	4.7	4.9	8.9	2.2
Tetrachloroethene										16
Toluene			3.6						2.5	
trans-1,4-Dichloro-^2-butene										
Trichloroethene										77
Vinyl chloride										
Xylenes (total)			3.4							
Semivolatile Organics (ug/kg)										
1,2-Dichlorobenzene										200
1,4-Dichlorobenzene										
1-Chloronaphthalene		230	5200	54		76				
2,4-Dimethylphenol										
2-Chloronaphthalene			700	62		69				
2-Methylnaphthalene		85								150
3/4-Methylphenol										
Acenaphthene	3100	530	150							91
Acetophenone										
Anthracene	4800	820	280	49		53				250
Benzidine										160
Benzo(a)anthracene	15000	1600	1300	170		290			120	1100
Benzo(a)pyrene	14000	1400	1700	200		880			130	1500
Benzo(b)fluoranthene	28000	2600	3500	330		780		46	130	2200
Benzo(g,h,i)perylene		900	1000	100		590			85	1200
Benzo(k)fluoranthene						670			130	
Benzoic acid										
bis(2-Ethylhexyl)^phthalate		960	3900	4100		4500				7800
Butyl benzyl phthalate										

TABLE B-2
FIRST QUARTER SEDIMENT SAMPLING DETECTIONS
6-12 inches (bgs), November 1994

	East Soldier Creek							West Soldier Creek		
	QE06	QE07	QE08	QE09	QE10	QE11	TR01	QW01	QW02	QW04
Chrysene	19000	1800	2100	290		620			160	1500
Di-n-butyl phthalate										150
Di-n-octyl phthalate			170	400		77				
Dibenz(a,h)anthracene		160								420
Dibenzofuran	1500	340	110							
Fluoranthene	38000	3700	6400	1000		3700		78	250	3500
Fluorene	2600	540								110
Indeno(1,2,3-cd)pyrene	4600	800	990	88		460			85	1000
Naphthalene	580	560	860							
Phenanthrene	37000	3800	2300	220		78			220	1300
Pyrene	55000	4300	3900	510		2600		71	220	2300

TABLE B-3
FIRST QUARTER SEDIMENT SAMPLING DETECTIONS
Greater than 12 inches (bgs), November 1994

	East Soldier Creek						West Soldier Creek		
	QE06 (3-5 feet)	QE07 (2-2.5 feet)	QE09 (3-4 feet)	QE10 (2.5-3.5 feet)	QE11 (1-1.5 feet)	TR01 (3-5 feet)	QW01 (2.5-3 feet)	QW02 (2-2.5 feet)	QW04 (3-3.5 feet)
Inorganics (mg/kg)									
Aluminum	2430	4130	4120	4430	3010	7810	21200	8420	11300
Barium	411	323	334	308	1450	425	94.5	102	227
Beryllium	0.23		0.29	0.3	0.26	0.47	1.9	0.71	0.68
Cadmium	5.8	19.8	72.1	1.3	27.2				12.8
Calcium	58700	140000	1860	643	28600	1110	22600	3420	5020
Chromium	53.7	70.4	110	14.8	205	13.3	24.1	49.8	114
Cobalt	4	4.7	3.8	2.7	4	4	15.7	8.8	10.7
Copper	48.3	41.6	14.5	2.3	17	2.3	42.8	5.7	13.8
Iron	5770	8060	7350	7940	6750	12700	19800	19300	11500
Lead	35.1	42.4	14.8	4.9	78.5	7	11.4	12.9	22.8
Magnesium	4160	5300	1000	842	6470	1210	22200	4920	2680
Manganese	322	222	172	90	508	126	998	188	603
Molybdenum	1.8		0.63		4.6	0.79	0.98	0.56	6.8
Nickel	30.3	36.2	13.7	5.7	95.5	8.1	40.4	28.5	213
Potassium	322	589	649	704	454	1080	4260	1380	1050
Silver		28.2	0.96		3.7				17.3
Sodium			126	86.9	147		611	158	112
Vanadium	13.5	13.1	11.6	13.5	16.9	20	22.7	44.7	22.9
Zinc	60.4	369	66.9	11.4	38.9	13.9	49.2	40.4	60.4
Arsenic	1.6	1.7	3.1	2.8	4.9	2.2	0.62	0.6	2.4
Mercury			0.19		0.17				
Selenium									0.26
Thallium						0.12			
Pesticides and PCBs (ug/kg)									
Aldrin			43						
alpha-Chlordane									
Aroclor 1254	590		280		740				220
delta-BHC		55							
Endrin									
Heptachlor		200			61				
Methoxychlor									
Volatile Organics (ug/kg)									
1,1,2,2-Tetrachloroethane									

TABLE B-3
FIRST QUARTER SEDIMENT SAMPLING DETECTIONS
Greater than 12 inches (bgs), November 1994

	East Soldier Creek						West Soldier Creek		
	QE06 (3-5 feet)	QE07 (2-2.5 feet)	QE09 (3-4 feet)	QE10 (2.5-3.5 feet)	QE11 (1-1.5 feet)	TR01 (3-5 feet)	QW01 (2.5-3 feet)	QW02 (2-2.5 feet)	QW04 (3-3.5 feet)
1,2,3-Trichloropropane									
2-Butanone (MEK)			3		13	1.3			2.1
Acetone	19	18	14	9.9	70	21	5.6		17
Acrylonitrile									
Benzene									
Carbon disulfide					21				5.4
Chlorobenzene			36		3.3				60
Chloromethane									
Ethylbenzene									
Methylene chloride	13	3	7.5	4.5	8.5	5.6	4.7	5.1	4.8
Tetrachloroethene									
Toluene									8.3
trans-1,4-Dichloro-^2-butene									
Trichloroethene									4.6
Vinyl chloride									13
Xylenes (total)									
Semivolatile Organics (ug/kg)									
1,2-Dichlorobenzene									150
1,4-Dichlorobenzene									82
1-Chloronaphthalene		600	260						
2,4-Dimethylphenol									52
2-Chloronaphthalene			120						
2-Methylnaphthalene	140								42
3/4-Methylphenol									
Acenaphthene	850	270	48						
Acetophenone		85							
Anthracene	1800	740	150						
Benzidine									
Benzo(a)anthracene	4200	3100	480						420
Benzo(a)pyrene	3100	2600	460						580
Benzo(b)fluoranthene	6600	5000	720						1000
Benzo(g,h,i)perylene	900	1500	280						310
Benzo(k)fluoranthene					46				
Benzoic acid									

TABLE B-3
FIRST QUARTER SEDIMENT SAMPLING DETECTIONS
Greater than 12 inches (bgs), November 1994

	East Soldier Creek						West Soldier Creek		
	QE06 (3-5 feet)	QE07 (2-2.5 feet)	QE09 (3-4 feet)	QE10 (2.5-3.5 feet)	QE11 (1-1.5 feet)	TR01 (3-5 feet)	QW01 (2.5-3 feet)	QW02 (2-2.5 feet)	QW04 (3-3.5 feet)
bis(2-Ethylhexyl)^phthalate	1000	1300	650		1200				990
Butyl benzyl phthalate									
Chrysene	4200	3100	620		64				580
Di-n-butyl phthalate									
Di-n-octyl phthalate			57						
Dibenz(a,h)anthracene									
Dibenzofuran	490	190							
Fluoranthene	7900	6400	1300		810				980
Fluorene	840	320	55						
Indeno(1,2,3-cd)pyrene	1000	1400	270						320
Naphthalene	500	480							
Phenanthrene	7800	3900	810						220
Pyrene	12000	4400	1000		130				580

TABLE B-4
SECOND QUARTER SEDIMENT SAMPLING DETECTIONS
0-6 inches (bgs), January 1995

Compound Name	East Soldier Creek										West Soldier Creek					
	QE01	QE02	QE03	QE05	QE06	QE07	QE08	QE09	QE11	TR01	QW01	QW02	QW03	QW04	QW05	QW06
Inorganics (mg/kg)																
Aluminum	1390	918	1100	1910	588	9040	9250	304	9070	7740	20800	15800	23400	15700	837	1720
Antimony						9.8					7.2			7.5		
Barium	533	475	919	450	310	361	645	14.4	449	1100	347	337	397	382	1080	2380
Beryllium			0.18	0.18		0.52	0.64		0.46	0.41	1.2	0.69	1.1	0.74		0.23
Cadmium	2	1.7	0.79	3	1.6	78	41.7		3.9	3.5	2.9	6.2	83.2	23.1	2.2	1.2
Calcium	103000	82900	128000	96900	54500	18000	27000	1100	16200	109000	19000	18100	23200	17900	88800	34200
Chromium	56.5	81.5	87.6	64.7	17.6	438	263	20.8	40.4	41	37.4	115	1230	553	50.9	43
Cobalt	9.3	5.8	2.2	11.4	1.3	13.3	9.5		4.8	5.9	10.4	7	123	41.2	2	4.2
Copper	13.6	125	107	37.9	21.9	124	315	2.5	13.7	6.3	28.3	76.5	650	85.3	9.7	5.7
Iron	6870	7140	4260	5590	2070	10900	13300	1160	17000	11400	20600	14500	24900	16800	13100	6130
Lead	17.7	81.9	28.4	34.6	14.5	96.3	86.5		14		32.2	49.5	225	174	46.6	9.7
Magnesium	6780	2390	14200	6010	2680	3780	4990	122	1810	16700	11500	4860	7090	4890	3310	3620
Manganese	268	125	188	195	72.9	145	264	20.6	326	445	836	166	234	538	156	820
Molybdenum	4.2	9.2		5.4		8.2	16.6					9.8	62.6	7.1		1.4
Nickel	48.6	195	19.9	52.1	39.3	110	91	1.7	14.1	41.9	28.5	106	3160	355	13.2	14.3
Potassium	168	141	202	257		1290	1170		1350	1190	4230	2630	3470	2310		282
Silver		53.2			2.1	7.7	4.5					6.5	205	19.5		
Vanadium	7.1	10.2	13.9	13.5	6.3	24.7	42.8	1.8	20.4	17.7	28.8	34.7	95.7	35.9	5.4	20.7
Zinc	127	102	70.4	96.4	37.3	204	314	4.1	35.3	21.2	61.5	340	1790	393	58.4	25.2
Arsenic	2	2.4	3.9	1.4	1.1	2.2	4.8	0.46	3.3	2.1	1.8	1.8	7.2	3.2	1.1	1.4
Mercury	0.16	0.16	0.12	0.071		0.31	0.21		0.081				0.9	0.17	0.12	
Selenium		0.33	0.41	0.25		1.4	1.2	0.23					12	1.2		
Pesticides and PCBs (ug/kg)																
Aldrin																
Aroclor 1254	80	15000	3900	530	320		1600			83		98	24000	1800	930	970
Heptachlor						1200	140		2.1							
Heptachlor epoxide																
Volatile Organics (ug/kg)																
2-Butanone (MEK)						20	21					16				
2-Hexanone							14									
4-Methyl-2-pentanone ^(MIBK)							5									
Acetone	15	26		6.6	11	98	92			9.4		100	19			
Acrylonitrile																
Benzene																
Carbon disulfide		5.6				2										
Chlorobenzene						3.4	310									
Chloroform																
Chloromethane																
Methylene chloride			3.5					2.1	1.6	2.1	2.4	2.8	5.4	2.4	1.9	2.5
Tetrachloroethene	2.3												5.5			
Toluene																

TABLE B-4
SECOND QUARTER SEDIMENT SAMPLING DETECTIONS
0-6 inches (bgs), January 1995

Compound Name	East Soldier Creek										West Soldier Creek					
	QE01	QE02	QE03	QE05	QE06	QE07	QE08	QE09	QE11	TR01	QW01	QW02	QW03	QW04	QW05	QW06
Trichloroethene													4.1			
Vinyl chloride																
Xylenes (total)							2.3									
Semivolatile Organics (ug/kg)																
1,2-Dichlorobenzene														250		
1,4-Dichlorobenzene																
1-Chloronaphthalene						610										
2,4-Dimethylphenol											50					
2-Chloronaphthalene																
2-Methylnaphthalene																
3/4-Methylphenol																
Acenaphthene	210	89	120			170	260							76		
Anthracene	510	170	160	71		260	620					69		140		
Benzidine																
Benzo(a)anthracene	1600	750	1500	680	130	2000	2100				74	600	980	730		54
Benzo(a)pyrene	1100	720	1300	690	100	2200	1800		46		100	700	1600	1100		67
Benzo(b)fluoranthene	2600	1600		1600	300	3900	4000		68		120	1400	3000	2100	48	110
Benzo(g,h,i)perylene	380	340	520	270		1100					61	220	1300	530		50
Benzo(k)fluoranthene			2800								68					
bis(2-Ethylhexyl)^phthalate	300	1000	630	490	430	3800	5700	150	330	410	340	520	8000	590	370	720
Chrysene	1900	860	1800	870	200	2000	2600		60		120	730	1700	1200		69
Di-n-butyl phthalate		130														
Di-n-octyl phthalate																
Dibenz(a,h)anthracene				98								69		150		
Dibenzofuran	120	46	93			96	160							56		
Dimethyl phthalate												57				
Fluoranthene	4200	1500	2400	1300	430	2700	6300	58	110	57	160	1100	1600	2100	46	130
Fluorene	270	85	84			140	300							67		
Indeno(1,2,3-cd)pyrene	380	300		290		1000	1000				54	210	1100	520		45
N-Nitrosodiphenylamine																
Naphthalene		50	200			1100	130							78		
Pentachlorophenol											55					
Phenanthrene	2900	740	1400	490	190	1200	3300		47		52	420		1200		42
Phenol															63	
Pyrene	3000	1400	2200	1100	390	2500	4500	48	78		130	940	1800	1600	47	87

TABLE B-5
SECOND QUARTER SEDIMENT SAMPLING DETECTIONS
6-12 inches (bgs), January 1995

	East Soldier Creek						West Soldier Creek			
	QE06	**QE07**	**QE08**	**QE09**	**QE11**	**TR01**	**QW01**	**QW02**	**QW03**	**QW04**
Inorganics (mg/kg)										
Antimony										6.2
Barium	706	470	417	30.7	235	1350	205	408	367	627
Beryllium		0.7	0.55		0.59	0.25	1.2	0.82	0.39	0.71
Cadmium	1.3	66.4	32.3	0.63		1.3		3.1	5	132
Calcium	36000	6640	4110	471	1250	1550	15200	4720	10300	12900
Chromium	21.2	172	233	25.1	18.2	23.1	25.8	72	60.4	2430
Cobalt		14.7	5.8		3.7	3.5	9.5	8.2	10.5	91.8
Copper	91.5	47.1	16.9	3.8	5.2	2.7	27.9	22.1	19.5	125
Iron	2290	13900	12000	1400	13800	7750	19800	16400	11200	17100
Lead	36	67.1	25		5.5	4.8	13.8	56.3	11.2	469
Magnesium	2250	2730	2120	193	1870	1350	12000	4540	2870	4130
Manganese	83.8	169	264	30.6	219	77.2	728	178	150	1750
Molybdenum		2						3.7	6.7	34.8
Nickel	6.3	64.1	68.8	4.4	11.4	13.4	23.4	55.6	288	1370
Potassium		957	1040		1750	794	4880	2250	1410	2090
Silver		3.7	3.3					1.4	4.8	72.2
Vanadium	4.7	27.1	19.6	2.1	25.1	9.9	25.6	33	22.8	42.1
Zinc	51.8	97	39.5	5.5	18.1	11.6	50	113	93.3	506
Arsenic	1.4	2.2	2.8	0.43	2	1.7	1.5	2.6	2	5.3
Mercury	0.12	0.3	0.088					0.12		0.17
Selenium		0.64		0.32					0.38	2
Pesticides and PCBs (ug/kg)										
Aldrin				1.4						
Aroclor 1254	300							97	33000	4200
Heptachlor		1400	230	2.1						
Heptachlor epoxide			210							
Volatile Organics (ug/kg)										
2-Butanone (MEK)		4.7						26		

TABLE B-5
SECOND QUARTER SEDIMENT SAMPLING DETECTIONS
6-12 inches (bgs), January 1995

	East Soldier Creek						West Soldier Creek			
	QE06	QE07	QE08	QE09	QE11	TR01	QW01	QW02	QW03	QW04
2-Hexanone										
4-Methyl-2-pentanone ^(MIBK)										
Acetone	13	39				13		130		
Acrylonitrile										
Benzene		1.5								
Carbon disulfide		2.9						1.8		
Chlorobenzene		3.4	3900							
Chloroform		2.5								
Chloromethane										3.3
Methylene chloride			390		2.6		1.6	2.4	1.9	4.3
Tetrachloroethene										
Toluene		2.9						1.6		2.5
Trichloroethene		1.7								
Vinyl chloride										15
Xylenes (total)										
Semivolatile Organics (ug/kg)										
1,2-Dichlorobenzene										570
1,4-Dichlorobenzene			76							210
1-Chloronaphthalene		2400	150							
2,4-Dimethylphenol										
2-Chloronaphthalene			210							
2-Methylnaphthalene		100	44							
3/4-Methylphenol								58		
Acenaphthene	80	490	67							260
Anthracene	350	1400	120							440
Benzidine									430	
Benzo(a)anthracene	1300	3000	270	50			150	250	44	2500
Benzo(a)pyrene	1200	2700	240	54			120	300	66	3100
Benzo(b)fluoranthene	2100	4900	520	99			140	580		6000

TABLE B-5
SECOND QUARTER SEDIMENT SAMPLING DETECTIONS
6-12 inches (bgs), January 1995

	East Soldier Creek						West Soldier Creek			
	QE06	QE07	QE08	QE09	QE11	TR01	QW01	QW02	QW03	QW04
Benzo(g,h,i)perylene	680	1600	120					110		1700
Benzo(k)fluoranthene							91		110	
bis(2-Ethylhexyl)^phthalate	540	11000	1400	230	690	570	280	410	280	7100
Chrysene	1300	3300	350	62			130	330	67	3100
Di-n-butyl phthalate		150								
Di-n-octyl phthalate		520								
Dibenz(a,h)anthracene										
Dibenzofuran		340								
Dimethyl phthalate										
Fluoranthene	2400	8100	1100	130		52	270	480	75	6700
Fluorene	80	560	78							230
Indeno(1,2,3-cd)pyrene	650	1500	120				44	110		1600
N-Nitrosodiphenylamine		150								
Naphthalene		3700	65							260
Pentachlorophenol										
Phenanthrene	1200	6200	670	59			150	180		3400
Phenol										
Pyrene	2200	6400	760	120		55	240	430	93	4500

TABLE B-6
SECOND QUARTER SEDIMENT SAMPLING DETECTIONS
Greater than 12 inches (bgs), January 1995

	East Soldier Creek			
	QE06 (1-2.5 feet)	**QE09 (1-3 feet)**	**QE11 (1-2 feet)**	**TR01 (3-5 feet)**
Inorganics (mg/kg)				
Aluminum	2110	518	9800	5610
Antimony				
Barium	368	59.6	667	1550
Beryllium	0.13		0.5	0.5
Cadmium	3.2	4.3		26.5
Calcium	32000	2030	1180	15400
Chromium	55.2	69	14.4	291
Cobalt	2.4	1.6	4.8	8
Copper	95.6	9.4	4.2	19.9
Iron	3860	2260	13500	21900
Lead	52.6	7.8		497
Magnesium	2200	282	1480	6110
Manganese	125	149	202	786
Molybdenum	2.6			1.3
Nickel	13.8	12.1	9.6	115
Potassium			1480	1010
Silver		1.5		17.3
Vanadium	10.3	3.2	22.3	18.8
Zinc	72.7	18.4	15.4	32.6
Arsenic	1.8	0.47	2	3.5
Mercury	0.063	0.11		
Selenium	0.46			
Pesticides and PCBs (ug/kg)				
Aldrin				
Aroclor 1254	500			
Heptachlor		36		
Heptachlor epoxide		36		

TABLE B-6
SECOND QUARTER SEDIMENT SAMPLING DETECTIONS
Greater than 12 inches (bgs), January 1995

	East Soldier Creek			
	QE06 (1-2.5 feet)	**QE09 (1-3 feet)**	**QE11 (1-2 feet)**	**TR01 (3-5 feet)**
Volatile Organics (ug/kg)				
2-Butanone (MEK)	40			
2-Hexanone				
4-Methyl-2-pentanone ^(MIBK)				
Acetone	160		15	19
Acrylonitrile			2.2	
Benzene				
Carbon disulfide	2.5	2		1.4
Chlorobenzene	49	3.7		
Chloroform				
Chloromethane				
Methylene chloride			2.6	2.5
Tetrachloroethene				
Toluene	1.7			
Trichloroethene				
Vinyl chloride				
Xylenes (total)	4.4			
Semivolatile Organics (ug/kg)				
1,2-Dichlorobenzene				
1,4-Dichlorobenzene				
1-Chloronaphthalene		240		
2,4-Dimethylphenol				
2-Chloronaphthalene				
2-Methylnaphthalene				
3/4-Methylphenol				
Acenaphthene	150			75
Anthracene	280	72		160
Benzidine				

TABLE B-6
SECOND QUARTER SEDIMENT SAMPLING DETECTIONS
Greater than 12 inches (bgs), January 1995

	East Soldier Creek			
	QE06 (1-2.5 feet)	**QE09 (1-3 feet)**	**QE11 (1-2 feet)**	**TR01 (3-5 feet)**
Benzo(a)anthracene	1100	350		420
Benzo(a)pyrene	850	400		350
Benzo(b)fluoranthene	1800	780		400
Benzo(g,h,i)perylene	500	340		130
Benzo(k)fluoranthene				230
bis(2-Ethylhexyl)^phthalate	6300	690	660	1800
Chrysene	1300	470		400
Di-n-butyl phthalate				
Di-n-octyl phthalate				
Dibenz(a,h)anthracene		110		
Dibenzofuran				
Dimethyl phthalate				
Fluoranthene	3300	880		860
Fluorene	140			76
Indeno(1,2,3-cd)pyrene	480	330		130
N-Nitrosodiphenylamine				
Naphthalene				
Pentachlorophenol				
Phenanthrene	1900	610		530
Phenol				
Pyrene	2400	800		660

TABLE B-7
THIRD QUARTER SEDIMENT SAMPLING DETECTIONS
0-6 inches (bgs), April 1995

	East Soldier Creek												West Soldier Creek					
	QE01	QE02	QE03	QE04	QE05	QE06	QE07	QE08	QE09	QE10	QE11	TR01	QW01	QW02	QW03	QW04	QW05	QW06
Inorganics (mg/kg)																		
Aluminum	1850	2700	7060	6790	1090	6280	8160	16100	3710	2490	2960	7800	21000	15000	14900	7010	1180	1900
Antimony					6.7													7.9
Barium	1740	787	415	546	578	529	360	695	371	1860	346	417	390	252	646	298	222	692
Beryllium				0.43		0.38	0.44	0.8	0.34	0.22	0.14	0.5	1.5	1.3	1.3	0.35	0.34	
Cadmium		4.7	4.5		2.6	11.6	106	45.5	81		13.5		0.69	4.2	57.7	12.5	2.5	4.2
Calcium	142000	43400	101000	48200	114000	25200	12400	38600	7620	3510	5680	1180	13700	97300	71100	11300	36300	116000
Chromium	6.7	211	186	13.6	28.7	170	209	291	433	9.6	151	13	28.3	70.2	1890	246	50.6	205
Cobalt		15	14.8	4.6	1.4	7.4	5.7	13.6	5.8	3.5	3	4.5	11.3	10.4	61.7	17	2.4	10.2
Copper	4.6	511	583	12.7	32.2	284	105	547	67.8	3.8	13.9	4.9	26.5	51.6	382	46.5	6	174
Iron	3960	6910	5490	11200	3120	10300	11000	20800	8520	10500	5590	13200	21100	17200	17400	13100	6370	7140
Lead		74.2	268	10.5	17.5	100	57.1	114	81.9		13.1		17.6	59.3	196	59.7	14.4	47.6
Magnesium	4950	2430	7560	4740	5180	3650	3120	6260	1680	1890	1940	1340	8180	7510	13600	3190	3300	10500
Manganese	392	138	766	250	105	189	233	297	211	465	156	318	778	235	345	391	208	274
Molybdenum		36.9	34.6	7.6		13.7		13.3	4.7	2.1	3.5				19.7	5.1		24.4
Nickel		380	353	11.5	7	65.8	91	91.8	64.9	8.1	44.2	9.1	34.3	75.5	2830	178	26.9	274
Potassium		291	206	799	140	840	921	2060	567	438	444	1050	3200	2300	1800	1010	160	192
Silver		3.1	6.2			2.1	4.3	5.8	5.2		2.6		0.97	5.3	91.9	12	1.2	3.6
Vanadium	9.1	23.8	14.2	16.4	7.1	30.7	17	45.1	14.9	15.3	8.4	21	27.2	33.6	67.9	23.2	18.4	18.5
Zinc	34.8	263	133	27.1	57.9	283	110	506	144	9.2	32.9	14.7	62	318	1280	195	36.9	116
Arsenic	1.4	8.4	2.1	1.4	1.2	4.7	3	5.7	1.7	0.46	1.1	1.7	1.7	1.9	5.4	1.8		1
Mercury	0.59	0.5	0.59		0.15	0.38	0.077	0.59	0.15		0.13				0.33	0.24		
Selenium		0.58	0.27			1.3		1.4							4.3	0.62		0.3
Thallium																0.2		
Pesticides and PCBs (ug/kg)																		
Aldrin							840	30	19		6.9			8.8				
alpha-BHC											2							
Aroclor 1254	280	40000	16000	150	350	2200								61	8400	1200	930	740
Endosulfan sulfate								41										
Heptachlor																		
Volatile Organics (ug/kg)																		
1,2-Dichloroethane			2.1															
2-Butanone (MEK)				3.3		96	5.3	2900		3.2		3.7		13				
Acetone		37	16			340	20	950	64			15		77	23	25	3.7	

TABLE B-7
THIRD QUARTER SEDIMENT SAMPLING DETECTIONS
0-6 inches (bgs), April 1995

	East Soldier Creek												West Soldier Creek					
	QE01	QE02	QE03	QE04	QE05	QE06	QE07	QE08	QE09	QE10	QE11	TR01	QW01	QW02	QW03	QW04	QW05	QW06
Benzene			1.7										1.6					
Carbon disulfide			1.5															
Chlorobenzene		1.9				9.9		18000										
Ethylbenzene																		
Methylene chloride	2.7	5.7	1.7		1.7	17		600					1.7			2.4	1.3	
Tetrachloroethene	6.6		17															
Toluene		5.7	2.1						58		1100			3.1		18		
trans-1,2-Dichloroethene																		1.5
Trichloroethene			1.9															
Xylenes (total)																		
Semivolatile Organics (ug/kg)																		
1,2-Dichlorobenzene			850															
1,3-Dichlorobenzene																		
1,4-Dichlorobenzene																		
1-Chloronaphthalene																		
2-Chloronaphthalene																		
2-Methylnaphthalene		410				320		350										
3/4-Methylphenol														140				
Acenaphthene	250	1600	820			1300	290	1400	97									
Acetophenone																		
Anthracene	1000	3800	2500		72	3600	880	5800	290							160	75	
Benzo(a)anthracene	2000	11000	7100	70	710	8100	2300	11000	870		57			360		1000	3500	
Benzo(a)pyrene	2200	9800	5600	61	640	7400	2200	7700	890					430	1100	1300	2100	
Benzo(b)fluoranthene	4000		11000	150	1400	10000	3800	19000	1500		95			810	2000			
Benzo(g,h,i)perylene	970	7600	3100		320	4000	1200	5700	450					240	800	1000	620	
Benzo(k)fluoranthene		15000				4700										2400	5300	
Benzoic acid					58		70											
bis(2-Ethylhexyl)^phthalate	2800	5100	2100	200	340	5200	2300	7800	1200		550			1400	6000	1500	4900	180
Butyl benzyl phthalate			4900		43	300												
Chrysene	2200	14000	8500	130	980	9300	2200	15000	1100		89			520	1100	1200	3700	
Di-n-octyl phthalate									180									
Dibenz(a,h)anthracene	380	1500	690		62	1100	260	1600								220	170	
Dibenzofuran	160	830	500			660	210	1000	83									
Fluoranthene	3200	17000	11000	190	1000	21000	5400	25000	2200	78	240			840	1700	1900	5300	44

TABLE B-7
THIRD QUARTER SEDIMENT SAMPLING DETECTIONS
0-6 inches (bgs), April 1995

	East Soldier Creek												West Soldier Creek					
	QE01	QE02	QE03	QE04	QE05	QE06	QE07	QE08	QE09	QE10	QE11	TR01	QW01	QW02	QW03	QW04	QW05	QW06
Fluorene	290	1600	850			1200	330	2400	120									
Indeno(1,2,3-cd)pyrene	1000	6100	2600		320	3600	1200	1000	390					220		910	600	
Isophorone									98									
N-Nitrosodiphenylamine											50							
Naphthalene	120	890	640			980	160	440	57									
Phenanthrene	2600	15000	8000	74	430	15000	3600	22000	1300		75			380		900	930	
Pyrene	3400	26000	16000	190	960	13000	3200	22000	2000	58	150			700	1400	2000	6400	

TABLE B-8
THIRD QUARTER SEDIMENT SAMPLING DETECTIONS
6-12 inches (bgs), April 1995

	East Soldier Creek								West Soldier Creek			
	QE02	**QE06**	**QE07**	**QE08**	**QE09**	**QE10**	**QE11**	**TR01**	**QW01**	**QW02**	**QW03**	**QW04**
Inorganics (mg/kg)												
Aluminum	1640	9830	7060	9710	4420	2810	7780	6300	16400	13400	4700	16200
Antimony		9.5					4.5					
Barium	1040	445	354	464	305	1200	784	346	320	756	172	481
Beryllium		0.52	0.39	0.55	0.35	0.33	0.51	0.54	1.2	1.2	0.55	1
Cadmium	12.1	48.8	74.8	42.1	183		2.6			4.4	2.2	
Calcium	81200	23300	10100	10300	3700	1180	5150	1290	16000	16700	5430	43800
Chromium	496	600	341	275	828	7.7	49.7	11.4	25	44	65.3	24.9
Cobalt	56.7	9	6.4	8	3.9	3.8	5.9	5	10.2	10.7	6.2	11.2
Copper	246	128	76.6	23.4	45	2.9	11.2	3.9	21.1	23	13	24.2
Iron	7390	13700	10100	16500	8210	7780	14600	13300	19200	16700	7260	21800
Lead	251	286	85.4	26.8	177		11.4		17.1	60.8	6.8	14
Magnesium	4640	6480	2860	2270	1560	951	3350	1050	9980	5080	2710	10300
Manganese	1240	323	260	2030	175	423	506	224	832	508	114	570
Molybdenum	56.4	5			3	2.5	1.8			9.1		
Nickel	1220	123	134	70.9	26.9	6.4	30.3	8.4	24.7	78.8	123	30.1
Potassium	182	1420	839	1230	553	483	998	795	2370	1430	612	2850
Silver	4.5	5.1	5.2	3.4	6.9		0.99			1		
Vanadium	18.9	21.6	17	20.9	14.6	11.9	20.8	22.9	29.5	38.4	19.4	23.3
Zinc	246	311	171	55.5	282	8.4	29.2	11.3	43.7	96.9	45.5	39.7
Arsenic	7.2	4.2	2	2.4	1.9	0.75	1.6	1.2	1.5	1.3	0.35	1.6
Mercury	0.55	0.81	0.069	0.3	0.1					0.098		
Selenium	0.79	0.5										
Thallium												
Pesticides and PCBs (ug/kg)												
Aldrin		55	650	8.7	9							
alpha-BHC												
Aroclor 1254	18000									900	9700	140
Endosulfan sulfate												

TABLE B-8
THIRD QUARTER SEDIMENT SAMPLING DETECTIONS
6-12 inches (bgs), April 1995

	East Soldier Creek								West Soldier Creek			
	QE02	**QE06**	**QE07**	**QE08**	**QE09**	**QE10**	**QE11**	**TR01**	**QW01**	**QW02**	**QW03**	**QW04**
Heptachlor		110										
Volatile Organics (ug/kg)												
1,2-Dichloroethane	5				6.8							
2-Butanone (MEK)	22	26		51	22			1.9		10		14
Acetone	83	81	21	230	240	14	14			42	15	11
Benzene	5.6											
Carbon disulfide	11											
Chlorobenzene	9.5	19		64	1.4							
Ethylbenzene	2.5											
Methylene chloride	4.4	2.3	1.9	15					1.6	2.5	2.1	
Tetrachloroethene	5.8											
Toluene	4.9	2		16	23		150					2.5
trans-1,2-Dichloroethene												
Trichloroethene												1.9
Xylenes (total)		1.7										
Semivolatile Organics (ug/kg)												
1,2-Dichlorobenzene			2200									48
1,3-Dichlorobenzene			100									
1,4-Dichlorobenzene			280									
1-Chloronaphthalene			3500									
2-Chloronaphthalene		350		310								
2-Methylnaphthalene			370	1000								
3/4-Methylphenol												
Acenaphthene	1800	750	1100		56							46
Acetophenone												
Anthracene	4400	1000	1800		120					52		260
Benzo(a)anthracene	13000	4900	4000		470				140	360	43	1200
Benzo(a)pyrene	11000	6000	2600		440				140	440		1300
Benzo(b)fluoranthene	20000	11000	4500	350	800				210	790		2200

TABLE B-8
THIRD QUARTER SEDIMENT SAMPLING DETECTIONS
6-12 inches (bgs), April 1995

	East Soldier Creek								West Soldier Creek			
	QE02	QE06	QE07	QE08	QE09	QE10	QE11	TR01	QW01	QW02	QW03	QW04
Benzo(g,h,i)perylene	6800	3400	980		310				88	260		650
Benzo(k)fluoranthene											81	
Benzoic acid												
bis(2-Ethylhexyl)^phthalate	23000	7200	2600	5600	320	69	1400		800	580	740	110
Butyl benzyl phthalate												
Chrysene	15000	6600	3300	280	550				150	440	42	1100
Di-n-octyl phthalate	11000											
Dibenz(a,h)anthracene	1300	670	140		59							200
Dibenzofuran	860	380	1000		46							
Fluoranthene	23000	12000	8100	3400	1200	82	93		310	780	84	1400
Fluorene	2200	580	1500									60
Indeno(1,2,3-cd)pyrene	5600	3100	1000		240				86	250		630
Isophorone												
N-Nitrosodiphenylamine												
Naphthalene		620	1600	570								
Phenanthrene	14000	7800	9500	510	770				150	470		640
Pyrene	33000	8600	5700	350	1000	64			280	660	74	1300

TABLE B-9
THIRD QUARTER SEDIMENT SAMPLING DETECTIONS
Greater than 12 inches (bgs), April 1995

	East Soldier Creek				West Soldier Creek	
	QE07 (1.5-2 feet)	QE09 (1-2.5 feet)	QE11 (1-2 feet)	TR01 (3-5 feet)	QW02 (2-2.5 feet)	QW04 (3-5 feet)
Inorganics (mg/kg)						
Aluminum	8280	4250	6370	4700	2360	7070
Antimony						
Barium	312	279	420	525	75.8	333
Beryllium	0.39	0.38	0.41	0.4	0.37	0.4
Cadmium	79.5	32.5	4			1.8
Calcium	2230	1730	2620	1110	2950	10500
Chromium	342	131	79.3	9.2	11.6	55.8
Cobalt	6.3	3.3	3.2	3.7	2.8	8.8
Copper	48.4	12.2	9.3	3.6	3.7	17.3
Iron	11200	8550	9040	10400	5360	13900
Lead	46.4	18		5.7		14
Magnesium	2130	1080	1670	819	1260	3990
Manganese	145	92.5	168	144	64.1	764
Molybdenum		1.3	1.1			
Nickel	124	12.9	22	6.8	16.8	44.6
Potassium	1120	650	847	705	473	1140
Silver	5	0.93	1.5			2.2
Vanadium	15.4	16.7	11.5	17.6	13	17.3
Zinc	160	49.3	20.3	9.8	13.7	57.6
Arsenic	1.3	1.4	3.3	1.3		1.2
Mercury	0.097					
Selenium						
Thallium						
Pesticides and PCBs (ug/kg)						
Aldrin		2.8				
alpha-BHC						
Aroclor 1254					98	150

TABLE B-9
THIRD QUARTER SEDIMENT SAMPLING DETECTIONS
Greater than 12 inches (bgs), April 1995

	East Soldier Creek				West Soldier Creek	
	QE07 (1.5-2 feet)	QE09 (1-2.5 feet)	QE11 (1-2 feet)	TR01 (3-5 feet)	QW02 (2-2.5 feet)	QW04 (3-5 feet)
Endosulfan sulfate						
Heptachlor	97					
Volatile Organics (ug/kg)						
1,2-Dichloroethane						
2-Butanone (MEK)		100	7.3	3.2	3.1	
Acetone		75	28	13		110
Benzene						
Carbon disulfide						
Chlorobenzene		1.7				100
Ethylbenzene						35
Methylene chloride					2.5	18
Tetrachloroethene						
Toluene		17	37			16
trans-1,2-Dichloroethene						
Trichloroethene						
Xylenes (total)						84
Semivolatile Organics (ug/kg)						
1,2-Dichlorobenzene						90
1,3-Dichlorobenzene						
1,4-Dichlorobenzene						100
1-Chloronaphthalene	2600					
2-Chloronaphthalene						
2-Methylnaphthalene						
3/4-Methylphenol						
Acenaphthene						180
Acetophenone						130
Anthracene						850
Benzo(a)anthracene	240	66				3100

TABLE B-9
THIRD QUARTER SEDIMENT SAMPLING DETECTIONS
Greater than 12 inches (bgs), April 1995

	East Soldier Creek				West Soldier Creek	
	QE07 (1.5-2 feet)	QE09 (1-2.5 feet)	QE11 (1-2 feet)	TR01 (3-5 feet)	QW02 (2-2.5 feet)	QW04 (3-5 feet)
Benzo(a)pyrene	270	57			49	3100
Benzo(b)fluoranthene	510	100			85	4500
Benzo(g,h,i)perylene	150					1400
Benzo(k)fluoranthene						
Benzoic acid						
bis(2-Ethylhexyl)^phthalate	1200	51	380		320	240
Butyl benzyl phthalate						
Chrysene	330	79			52	2900
Di-n-octyl phthalate						
Dibenz(a,h)anthracene						
Dibenzofuran						
Fluoranthene	1000	170			100	4900
Fluorene						240
Indeno(1,2,3-cd)pyrene	130					1200
Isophorone						
N-Nitrosodiphenylamine						
Naphthalene	360					
Phenanthrene	580	83			68	2500
Pyrene	660	140			83	4900

TABLE B-10
FOURTH QUARTER SEDIMENT SAMPLING DETECTIONS
0-6 inches (bgs), July 1995

	East Soldier Creek												West Soldier Creek					
	QE01	QE02	QE03	QE04	QE05	QE06	QE07	QE08	QE09	QE10	QE11	TR01	QW01	QW02	QW03	QW04	QW05	QW06
Inorganics (mg/kg)																		
Aluminum	1820	1260	1260	1390	1910	8820	3140	6250	4540	3010	3580	6030	10200	12900	11400	13400	3490	1490
Antimony		7.1	6.5		5.4			8.6										8.1
Barium	536	714	410	480	370	850	1220	592	449	1680	1330	558	275	369	726	552	399	1690
Beryllium			0.17		0.22	0.64	0.34	0.59	0.45	0.3	0.42	0.49	0.63	0.8	0.85	0.84	0.29	0.23
Cadmium	1.3	2.9	2.5	3	2.6	18.7	164	155	415	66.6	28.3		0.86	4.5	3.3	10.1	3.9	7.9
Calcium	131000	79800	106000	210000	48300	42100	159000	22700	10500	63200	62500	1270	7900	72400	81300	15500	20500	57900
Chromium	11.7	187	42.1	35.4	106	268	324	2040	1130	481	347	12.2	21.1	45.9	47.2	196	68.1	53.6
Cobalt	2.2	21.1	1.8	1.9	4.5	10	6.5	21.6	11.2	6.2	7	4.7	8.2	9.7	13.3	19.9	5.1	5.3
Copper	14.7	292	126	24.4	81.8	508	87	231	77.3	43.7	20.8	4.1	9.6	29.3	46.9	35.9	7.9	2210
Iron	7460	24900	4890	5370	6370	16000	8910	14400	8240	19800	12900	12600	13500	15400	15100	17400	7760	13900
Lead	28.2	240	60.7	20.4	47	142	120	156	363	39.5	54.7	16.5	38	57	51	66.7	18.3	4400
Magnesium	4190	4030	3870	7010	3410	5570	7170	3390	2670	24000	30600	995	3070	6440	5330	7280	8030	12900
Manganese	261	424	168	318	221	239	604	338	320	1610	1930	240	605	331	396	1160	689	638
Molybdenum		20.9	0.79		17.7	25.5		18.6	3.3	1.9					4.1	7.3		
Nickel	8.7	325	17.8	13.3	150	82.7	203	747	108	287	143	8.8	17.9	67	113	131	39.6	44.7
Potassium	377	204	228	248	282	1210	261	968	692		432	884	1220	1930	1390	1550	643	236
Silver		7.7				2.4	6.4	14.7	18.7	16.2	6.5			2.8	9.3	6.8	2.8	1.4
Sodium											191							
Vanadium	11.6	19.6	10.1	9.4	16.6	48.3	20.9	26.9	15.9	17.1	24.4	23.1	26.1	26.1	29.2	34.4	13.1	14.4
Zinc	65.1	173	93.8	61.4	102	512	491	280	322	163	57.5	12.8	90.4	117	171	128	30	890
Arsenic	1.4	4.1	1.6	0.95	2.1	7.2	6.2	5.1	2.3	4.6	1.9	1.9	1.6	2.6	3.8	4	4.8	9
Mercury	0.27	0.43	0.18	0.17	0.13	0.63	0.55	0.4	0.3	0.6	0.13							
Selenium		0.25						1										
Thallium															0.12	0.14		
Pesticides and PCBs (ug/kg)																		
Aroclor 1254	300	25000	510	330	1200	3500		3000	930	9700	550			940	320	360	330	220
Heptachlor							52000	220	140	970	43							
Volatile Organics (ug/kg)																		
2-Butanone (MEK)		5.8			1.9	31		80	4.9		4.9						7.7	
Acetone	4.8	27		3.8		140	10	490	21		17	8.3					30	
Acrolein																		
Carbon disulfide		3.7						8.7		2.6								
Chlorobenzene		1.4							120									
Methylene chloride	2.1	3.8	2.4	2.2		7.1	2		1.6				2.3	3.1	3.9	1.3	2.6	2.4
Tetrachloroethene		3.6																
Toluene		2.1							2						3			
Xylenes (total)																		

FOURTH QUARTER SEDIMENT SAMPLING DETECTIONS
0-6 inches (bgs), July 1995

	East Soldier Creek												West Soldier Creek					
	QE01	QE02	QE03	QE04	QE05	QE06	QE07	QE08	QE09	QE10	QE11	TR01	QW01	QW02	QW03	QW04	QW05	QW06
Semivolatile Organics (ug/kg)																		
1,2-Dichlorobenzene							310			130								
1,4-Dichlorobenzene																		
1-Chloronaphthalene							140		1000	1300								
2,4-Dimethylphenol																		
2-Chloronaphthalene								1400	760									
2-Methylnaphthalene				1200						110				120				
3/4-Methylphenol											160							
Acenaphthene		1200		8000			81		120	540				450		41		
Acenaphthylene														44				
Anthracene		2300		26000	1100	2200	140	700	110	790				740	54	59		
Benzo(a)anthracene		6800	770	39000	3600	8200	720	1900	530	1500	120			1900	440	260		
Benzo(a)pyrene		6300	750	26000	3200	8800	670	1700	550	1300	48			1400	470	300		
Benzo(b)fluoranthene		6300	1400		3100	9800	1300	3300	1000	2300	100		40	2700	860	650	65	
Benzo(g,h,i)perylene		3400	510	17000	1600	4900	450	1000	260	600				590	280	200		
Benzo(k)fluoranthene		5500		39000	3400	9300												
bis(2-Ethylhexyl)^phthalate		11000	970	710	1000	6300	2800	17000	4900	3000	1600			230	160	190	87	130
Butyl benzyl phthalate		560																
Chrysene		7200	1200	35000	4400	11000	1000	2700	780	2100	130			2200	510	390	51	
Di-n-butyl phthalate																		
Di-n-octyl phthalate								700	330									
Dibenz(a,h)anthracene		1600		10000	680	2200	130			200								
Dibenz(a,j)acridine				1400														
Dibenzofuran		740		5500			56			270				360				
Dimethyl phthalate	480	660		410										67	75		45	
Fluoranthene		13000	2200	53000	7800	21000	1800	6700	2400	4400	450			3300	720	740	78	
Fluorene		1300		12000	430	1100	93		91	440				570				
Indeno(1,2,3-cd)pyrene		3700	470	19000	1700	5400	420	800	270	630				620	240	170		
Isophorone																		
Naphthalene		1000		5900			380		1700	4900				450				
Phenanthrene		10000	1000	58000	4700	12000	920	2900	880	4600				3300	370	460		
Pyrene		12000	2100	51000	7600	17000	1500	4500	1300	3600	170			3100	730	510	60	

TABLE B-11
FOURTH QUARTER SEDIMENT SAMPLING DETECTIONS
6-12 inches (bgs), July 1995

	East Soldier Creek							West Soldier Creek			
	QE03	QE06	QE08	QE09	QE10	QE11	TR01	QW01	QW02	QW03	QW04
Inorganics (mg/kg)											
Aluminum	1670	7560	6930	4760	4650	5810	7120	7680	8880	12900	9550
Antimony											
Barium	206	580	554	284	338	1050	481	234	524	764	635
Beryllium		0.56	0.55	0.36	0.4	0.6	0.52	0.47	0.69	0.82	0.76
Cadmium	2.1	50.6	108	31.5		16.2		1.1	6.6	3.2	104
Calcium	174000	8260	16500	4840	688	53800	1390	4260	10300	43100	15700
Chromium	27.3	351	950	107	12.7	197	13.2	27.2	50.4	48.3	3210
Cobalt	3.5	8.5	23.8	4.1	2.6	14.6	5	4.9	9.2	11.9	126
Copper	52.7	92.9	175	12.2	3.2	18.3	4	7.6	26.5	23.3	143
Iron	5260	12900	11400	9070	9590	12500	12000	11600	14000	16000	22200
Lead	22.2	100	110	26.1	10.8	21.2	11.6	32.6	59.3	50.8	746
Magnesium	3700	2620	2880	1350	998	17000	1130	2280	5490	4870	6090
Manganese	210	518	424	1000	105	1380	234	311	335	445	4250
Molybdenum		5.6	5						2	2.8	17.9
Nickel	20.3	93	273	36.4	8.7	72.9	10.1	15	63.6	85.4	861
Potassium	343	1050	979	759	689	990	1040	1030	1070	1590	1130
Silver		5	15.9	2.2		1.1			0.55	3.6	11.7
Sodium				165		148	155				
Vanadium	11.3	29.6	25.9	14.5	16.6	22.7	22.6	21.6	31.1	28.5	47
Zinc	59.8	123	186	35.4	9.6	34.9	14.1	39.3	82.9	106	542
Arsenic	1.5	3.2	3.7	2.6	2.1	4	1.8	1.9	1.7	3.8	5.7
Mercury	0.17	0.26	0.58	0.16					0.28		
Selenium											0.85
Thallium							0.16		0.15	0.17	0.18
Pesticides and PCBs (ug/kg)											
Aroclor 1254	820	1400	750	390		74			17000	270	410
Heptachlor				49		9.7					
Volatile Organics (ug/kg)											
2-Butanone (MEK)		13		12	5	15					
Acetone		49	82	29	19	61	12				9.7
Acrolein						10					
Carbon disulfide				1.2		9.6					
Chlorobenzene		64	3.9	43		5.4					
Methylene chloride	2.7	1.6		2		1.4	1.4		3.4	7.2	4.3
Tetrachloroethene											
Toluene										2.7	
Xylenes (total)											

TABLE B-11
FOURTH QUARTER SEDIMENT SAMPLING DETECTIONS
6-12 inches (bgs), July 1995

	East Soldier Creek							West Soldier Creek			
	QE03	QE06	QE08	QE09	QE10	QE11	TR01	QW01	QW02	QW03	QW04
Semivolatile Organics (ug/kg)											
1,2-Dichlorobenzene											
1,4-Dichlorobenzene						46					
1-Chloronaphthalene		960		130							
2,4-Dimethylphenol											350
2-Chloronaphthalene		580	1000	220		51					
2-Methylnaphthalene									100		
3/4-Methylphenol											220
Acenaphthene	510			60					460		320
Acenaphthylene											
Anthracene	840								590	50	430
Benzo(a)anthracene	3200	830	990	150					2400	360	2400
Benzo(a)pyrene	2800	1200		160		120			3100	340	3200
Benzo(b)fluoranthene	3400	1800	1600	320				60	4600	650	6600
Benzo(g,h,i)perylene	1500	430		110					1600	160	1900
Benzo(k)fluoranthene	2600								2200		
bis(2-Ethylhexyl)^phthalate		3100	16000	1800		140			89	91	
Butyl benzyl phthalate											
Chrysene	3900	1300	1600	200				40	3900	400	5000
Di-n-butyl phthalate		4600									
Di-n-octyl phthalate											
Dibenz(a,h)anthracene	640										490
Dibenz(a,j)acridine									89		
Dibenzofuran									310		250
Dimethyl phthalate	530									39	
Fluoranthene	8000	3100	5900	470		76		53	6600	710	6400
Fluorene	530								380		240
Indeno(1,2,3-cd)pyrene	1600	480		100					1500	150	1700
Isophorone				57							
Naphthalene		800		590					360		420
Phenanthrene	5000	1200	1100	210					5100	330	5200
Pyrene	7100	2000	2400	320				46	4800	690	6800

TABLE B-12
FOURTH QUARTER SEDIMENT SAMPLING DETECTIONS
Below 12 inches (bgs), July 1995

	East Soldier Creek				West Soldier
	QE06 (1.5-2 feet)	QE09 (2.5-3 feet)	QE10 (1.5-2 feet)	TR01 (3-5 feet)	QW04 (2.5-3 feet)
Inorganics (mg/kg)					
Aluminum	7980	4040	4740	5220	22000
Antimony					
Barium	596	278	992	377	4700
Beryllium	0.68	0.29	0.34	0.43	1.5
Cadmium	106	84.1			
Calcium	6660	9090	631	1240	9610
Chromium	402	281	10.9	10.8	31.1
Cobalt	9.1	4.1	3.7	4.3	12.9
Copper	67.2	20.7	3.2	3.6	29.4
Iron	14100	7080	11000	11800	28500
Lead	119	58.6	11	11.7	23.4
Magnesium	2610	1730	1050	888	9040
Manganese	528	337	105	212	543
Molybdenum	3.2	2.2			
Nickel	104	80.7	8.6	7.9	36.5
Potassium	1090	662	676	853	2750
Silver	7.4	6.2			
Sodium					226
Vanadium	30.2	12.8	20	20.3	34.2
Zinc	130	65.3	10.4	11.1	47.6
Arsenic	2.8	1.8	2.6	2.5	3.6
Mercury	0.19	0.13			
Selenium					
Thallium					
Pesticides and PCBs (ug/kg)					
Aroclor 1254	930				
Heptachlor		3100			

TABLE B-12
FOURTH QUARTER SEDIMENT SAMPLING DETECTIONS
Below 12 inches (bgs), July 1995

	East Soldier Creek				West Soldier
	QE06 (1.5-2 feet)	QE09 (2.5-3 feet)	QE10 (1.5-2 feet)	TR01 (3-5 feet)	QW04 (2.5-3 feet)
Volatile Organics (ug/kg)					
2-Butanone (MEK)	22	18		3.6	
Acetone	80	72		18	12
Acrolein					
Carbon disulfide		5.3			
Chlorobenzene	170	220			1.8
Methylene chloride	2.1	2.3	1.8		2.2
Tetrachloroethene					
Toluene	1.3	1.8			
Xylenes (total)		1.7			
Semivolatile Organics (ug/kg)					
1,2-Dichlorobenzene					
1,4-Dichlorobenzene		120			
1-Chloronaphthalene		490			
2,4-Dimethylphenol					
2-Chloronaphthalene		560			
2-Methylnaphthalene					
3/4-Methylphenol					
Acenaphthene		190			
Acenaphthylene					
Anthracene		170			
Benzo(a)anthracene	840	440			66
Benzo(a)pyrene	920	470			81
Benzo(b)fluoranthene	1700	790			170
Benzo(g,h,i)perylene	510	270			67
Benzo(k)fluoranthene					
bis(2-Ethylhexyl)^phthalate	6600	7700			
Butyl benzyl phthalate					

TABLE B-12
FOURTH QUARTER SEDIMENT SAMPLING DETECTIONS
Below 12 inches (bgs), July 1995

	East Soldier Creek				West Soldier
	QE06 (1.5-2 feet)	QE09 (2.5-3 feet)	QE10 (1.5-2 feet)	TR01 (3-5 feet)	QW04 (2.5-3 feet)
Chrysene	1300	780			120
Di-n-butyl phthalate					
Di-n-octyl phthalate					
Dibenz(a,h)anthracene					
Dibenz(a,j)acridine					
Dibenzofuran		110			
Dimethyl phthalate					
Fluoranthene	2800	4800			240
Fluorene		170			
Indeno(1,2,3-cd)pyrene	540	250			55
Isophorone					
Naphthalene		2500			
Phenanthrene	1800	720			140
Pyrene	2000	1200			180

TABLE B-13
FIRST QUARTER SURFACE WATER SAMPLING DETECTIONS
November 1995

	East Soldier Creek											West Soldier Creek			
	QE01	QE02	QE03	QE04	QE05	QE06	QE07	QE08	QE09	QE10	QE11	QW03	QW04	QW05	QW06
Inorganics (mg/L)															
Aluminum			0.04				0.2	0.13	0.27	0.086	0.17	0.28	4.3	0.05	0.091
Barium	0.45	0.61	0.61	0.54	0.45	0.45	0.49	0.27	0.27	0.28	0.26	0.33	0.13	0.36	0.38
Cadmium											0.0036				
Calcium	42.4	90.4	92.4	70.3	49.4	47.1	47	48.2	33.1	55.5	47	51.1	23.7	68.4	73.7
Chromium			0.01					0.039		0.031	0.036		0.011		
Cobalt												0.031			
Copper	0.014	0.11	0.11	0.053	0.044	0.025	0.021	0.014	0.028	0.016	0.015	0.014	0.019	0.018	0.017
Iron	0.11	0.1	0.14	0.083	0.1	0.092	0.17	0.21	0.3	0.19	0.24	1.5	3.4		0.09
Magnesium	20.7	43.3	44.3	33.7	23.3	22.5	22.4	20.4	13.2	24.6	19.8	9.3	5.3	30.2	32.6
Manganese	0.0059	0.0042	0.0074	0.0054	0.0064	0.0052	0.0091	0.2	0.02	0.22	0.18	0.35	0.05	0.0049	0.013
Molybdenum		0.53	0.57	0.31	0.079	0.046		0.024	0.04	0.014	0.02	0.077	0.02	0.42	0.48
Nickel								0.01			0.0095	0.33	0.024		
Potassium	1.7	5.4	5.6	3.6	2	1.9	2	4	2.1	5.7	4.3	1.4	3.8	2.9	3.1
Sodium	14	27.6	28.1	21.6	15.8	15.1	13.8	125	11.1	203	122	16.7	7.7	55.2	58.7
Vanadium	0.015	0.028	0.026	0.021	0.013	0.013	0.017		0.0075	0.0058	0.0063		0.013	0.014	0.014
Zinc	0.017	0.032	0.033	0.022	0.022	0.019	0.026	0.026	0.04	0.028	0.027	0.059	0.068	0.025	0.026
Arsenic		0.0022	0.0026	0.0019								0.0025		0.001	
Lead		0.0023										0.0066	0.006		
Selenium												0.0036			
Volatile Organics (ug/L)															
2-Butanone (MEK)				1.7		2.8									
Acetone	6.6	8	11	7.4		5.3	7.9								
Bromoform		1.9	1.9												
Methylene chloride	1.6		1.3	2.3	5.6		2.5	8.4	11	10	8.2	2.6	1.1	2.7	2.3
Tetrachloroethene												2.8	11		
Trichloroethene													3.1		
Semivolatile Organics (ug/L)															
4-Nitrophenol								1.7	1.6						
Benzyl alcohol	1														
bis(2-Ethylhexyl)^phthalate		1													
N-Nitroso-di-^n-propylamine													1.8		

TABLE B-14
SECOND QUARTER SURFACE WATER SAMPLING DETECTIONS
January 1995

	East Soldier Creek											West Soldier Creek			
	QE01	QE02	QE03	QE04	QE05	QE06	QE07	QE08	QE09	QE10	QE11	QW03	QW04	QW05	QW06
Inorganics (mg/L)															
Aluminum	0.055				0.055	0.062	0.11	0.33	0.27	0.28	0.33	0.55	0.1	0.031	
Barium	0.44	0.43	0.41	0.43	0.46	0.38	0.26	0.25	0.31	0.25	0.19	0.14	0.14	0.26	0.26
Cadmium									0.0061						
Calcium	41.7	74.4	67.8	45.6	50.2	43.9	31.3	34.8	47.6	44.7	37	32.7	30.6	60.1	60.3
Chromium		0.0075	0.0075			0.0077		0.0078	0.52	0.18	0.054				
Cobalt									0.0066	0.0068		0.004			
Copper	0.0032	0.08	0.07	0.018	0.017	0.018	0.02	0.02	0.013	0.012	0.0093	0.011	0.014	0.019	0.014
Iron	0.065	0.09	0.079	0.071	0.079	0.09	0.11	0.26	1.3	0.45	0.39	0.3	0.48	0.096	0.1
Magnesium	21	33.3	30.5	22.2	24.2	19.6	11.5	12.9	18.6	17.4	13.9	3.8	3.7	23.1	22.2
Manganese	0.0097	0.0068	0.0066	0.0063	0.0069	0.01	0.012	0.04	0.13	0.13	0.12	0.087	0.054	0.0082	0.0048
Molybdenum		0.42	0.37	0.046	0.073	0.046		0.049	0.023	0.022	0.025	0.024	0.038	0.077	0.073
Nickel						0.014			0.093	0.08	0.05	0.027	0.03		
Potassium	1.5	5	4.7	1.8	2	2.4	1.8	2.7	3.4	3.6	2.9	2.4	2	2	2.2
Sodium	14.2	26.8	26.6	18.1	20.6	15.2	9.1	11.8	78.1	106	81.1	7.8	4.5	48.4	46.5
Vanadium	0.012	0.018	0.018	0.012	0.012	0.014	0.0083	0.011	0.0086	0.0053	0.0058	0.0072		0.012	0.0098
Zinc	0.017	0.026	0.025	0.022	0.026	0.022	0.037	0.041	0.043	0.037	0.033	0.044	0.028	0.019	0.016
Arsenic		0.0023	0.0028		0.0023	0.001	0.0011	0.0017	0.0016	0.0013	0.0014	0.0019	0.0035	0.0018	0.0013
Lead				0.03			0.002	0.0036	0.003	0.0024	0.0025	0.0051	0.0012		
Mercury									0.00018						
Selenium	0.003	0.0041													
Pesticides and PCBs (ug/L)															
Aldrin									0.062	0.086					
Volatile Organics (ug/L)															
Acetone													4.6		
Carbon disulfide														1	
Chlorobenzene													1.8		
Chloroform		1.8	1.4												
Methylene chloride							1.4	1.2	150	51	22		1.4		
Tetrachloroethene									1.2			7.6			
Toluene						1.1		1.4							
Trichloroethene													14		

TABLE B-14
SECOND QUARTER SURFACE WATER SAMPLING DETECTIONS
January 1995

	East Soldier Creek											West Soldier Creek			
	QE01	QE02	QE03	QE04	QE05	QE06	QE07	QE08	QE09	QE10	QE11	QW03	QW04	QW05	QW06
Vinyl chloride													1		
Semivolatile Organics (ug/L)															
3/4-Methylphenol						1.3									
4-Nitrophenol						1.2		2							
Benzoic acid						1.3									
Benzyl alcohol						1.7									
bis(2-Ethylhexyl)^phthalate						0.99		0.94	3.2	3.6	1.4			1.9	
Fluoranthene							1.5	1.2							
Phenanthrene							1.6								
Phenol						3.5			1.6	1					

TABLE B-15
THIRD QUARTER SURFACE WATER SAMPLING DETECTIONS
April 1995

	East Soldier Creek											West Soldier Creek				
	QE01	QE02	QE03	QE04	QE05	QE06	QE07	QE08	QE09	QE10	QE11	QW02	QW03	QW04	QW05	QW06
Inorganics (mg/L)																
Aluminum						0.7		0.28	0.19	0.24	0.33	0.43		0.17		
Barium	0.37	0.37	0.4	0.39	0.44	0.35	0.35	0.34	0.28	0.27	0.26	0.19	0.18	0.13	0.17	0.18
Calcium	35.9	44	59.6	44.2	61.2	40.6	33.7	42	42.9	41.3	41	36.1	30.5	28.2	40.7	41.2
Chromium			0.027	0.0083	0.011	0.014			0.031	0.024	0.026					
Cobalt													0.008			
Copper	0.0048	0.084	0.098	0.022	0.039	0.048	0.011	0.026	0.0087	0.0075	0.008	0.014	0.0062	0.0074	0.0095	0.0095
Iron	0.039	0.081	0.12	0.039	0.058	0.86	0.07	0.29	0.26	0.28	0.39	1.4	0.88	0.6	0.11	0.072
Magnesium	17.5	21	29.3	21.9	29.9	18.9	15.8	19.1	20.6	19.5	19.1	3.1	3.5	4.4	16.9	16
Manganese	0.0064	0.008	0.0089	0.0052	0.0068	0.03	0.0083	0.027	0.13	0.12	0.17	0.36	0.41	0.44	0.0062	0.0058
Molybdenum		0.045	0.17	0.052	0.2	0.026		0.069								
Nickel		0.014											0.033	0.018		
Potassium	1.2	1.5	2.7	1.8	3.1	1.6	0.97	2.2	4.1	4.5		0.94	0.99	1.4	1	1.2
Sodium	13.1	31.9	43.8	18.9	20.2	13.5	8.7	16.2	123	122	120		2.9	3.3	33.7	32.5
Vanadium	0.011	0.011	0.017	0.014	0.017	0.014	0.007	0.011								
Zinc	0.0098	0.022	0.025	0.014	0.017	0.034	0.02	0.018	0.012	0.011	0.013	0.017	0.0052	0.0063	0.005	0.0072
Arsenic	0.0015		0.0022		0.0024	0.0013		0.0014		0.0013			0.001	0.0014		
Lead				0.0033		0.0054	0.001	0.0013				0.0035				
Selenium											0.0041					
Thallium											0.0012				0.0011	
Volatile Organics (ug/L)																
Acetone		8.4	6.9		7.5					6.1	6.1			6.7		
Bromoform			2.6		2.2											
Methylene chloride	2.8	2.3	1.9	2.3	1.3			1.5		1.1	1			2	2.4	2.1
Tetrachloroethene													2.1	2		
Toluene												1.7				
Trichloroethene													1.6	1.4		
Semivolatile Organics (ug/L)																
3/4-Methylphenol												1.7				
4-Nitrophenol					1.2											
Benzoic acid					2.9											
Phenol	1.2				2.1			2.7		1	1.2	1.4				

TABLE B-16
FOURTH QUARTER SURFACE WATER SAMPLING DETECTIONS
Sampling Detections, July 1995

	East Soldier											West Soldier	
	QE01	QE02	QE03	QE04	QE05	QE06	QE07	QE08	QE09	QE10	QE11	QW05	QW06
Inorganics (mg/L)													
Aluminum	0.032	0.069		0.025	0.054	0.044	0.14	0.15	0.066	0.038	0.055	0.1	0.076
Barium	0.6	0.68	0.65	0.58	0.57	0.49	0.38	0.58	0.42	0.41	0.48	0.27	0.34
Calcium	69.2	99.6	97.5	74.2	71.6	56.2	32	68	59	59.4	62.5	62.6	65.3
Chromium	0.013	0.015	0.012	0.0087	0.012	0.0076	0.0058	0.028	0.053	0.056	0.041		
Copper	0.079	0.3	0.26	0.13	0.15	0.13	0.031	0.055	0.022	0.02	0.026	0.0046	0.0037
Iron	0.045	0.096	0.047	0.037	0.078	0.058	0.14	0.18	0.24	0.22	0.28	0.1	0.26
Magnesium	33.1	45.7	44.6	34.9	33.7	26.9	16.8	33.7	28.6	28.6	30.6	28.4	29.9
Manganese	0.0054	0.0057	0.0065	0.0053	0.0083	0.0082	0.019	0.031	0.093	0.13	0.14	0.014	0.093
Molybdenum	0.12	0.3	0.3	0.17	0.14	0.086		0.12	0.041	0.037	0.066		
Nickel	0.011		0.012		0.013	0.016							
Potassium	3.5	5.7	5.2	3.7	3.6	2.4	1.3	3.4	4.5	5	5.6	1.4	1.7
Sodium	20.5	28.6	27.8	22.5	22.9	17.2	9.6	31.5	106	111	109	65.7	66.4
Vanadium	0.022	0.03	0.028	0.023	0.02	0.016	0.0072	0.02	0.0067	0.0091	0.011	0.0082	0.0059
Zinc	0.022	0.027	0.024	0.021	0.031	0.022	0.023	0.019	0.019	0.011	0.032	0.0059	0.011
Arsenic	0.0019	0.0033	0.0029	0.0024	0.0015	0.0015		0.0014			0.0012		
Lead	0.002	0.0011	0.0014	0.0014	0.0022	0.0048	0.0021	0.0021					0.0034
Selenium	0.0024												
Volatile Organics (ug/L)													
Acetone		12					8.4	11	10	5.2			
Bromoform	1.7	1.3	1.4	1.6	1.8								
Methylene chloride	2.1	1.9		2		3.4	4.5	4.4	5.1	2.3	4.1	1.1	
Semivolatile Organics (ug/L)													
Benzoic acid	2.9	3.9	2										
Benzyl alcohol		1.2											
bis(2-Ethylhexyl)^phthalate					4.6						2.8		
Diethyl phthalate		1.2											

TABLE B-17
STATISTICAL EVALUATION OF ANALYTES TENTATIVELY IDENTIFIED IN SEDIMENT SAMPLES

Compound Name	Frequency of Detection	Average Result	Maximum Result	Minimum Result
Volatile Organics (ug/kg)				
1,2-Dichlorobenzene	3	17.33	24	10
1,2-Dichloroethene ^(cis)	2	27.50	39	16
1,3-Dichlorobenzene	2	9.75	13	6.5
1,4-Dichlorobenzene	3	62.03	150	8.1
1-Chloronaphthalene	6	99.06	640	8.5
1-Decene, 4-methyl-	1	51.00	51	51
1-Heptanol, 2-propyl-	1	100.00	100	100
1-Heptene, 2-isohexyl-6-methyl-	1	7.50	7.5	7.5
1-Hexanol, 2-ethyl-	1	76.00	76	76
1-Hexene, 5,5-dimethyl-	1	15.00	15	15
1-Pentene, 2,4,4-trimethyl-	3	198.33	510	16
1-Pentene, 3,4-dimethyl-	1	53.00	53	53
1-Tridecene	2	285.00	450	120
1-Undecene	1	35.00	35	35
1-Undecene, 5-methyl-	1	320.00	320	320
1H-3a,7-Methanoazulene, 2,3,4,7,8,8a,-hexahydro-3,	1	6.90	6.9	6.9
1H-Indene, 2,3-dihydro-4,7-dimethyl-	1	28.00	28	28
1H-Indene, octahydro-2,2,4,4,7,7-^hexamethyl-	2	63.25	120	6.5
1H-Pyrrolo[2,3-b]pyridine, 2-^(1-methylethyl)-	1	28.00	28	28
1H-Pyrrolo[2,3-b]pyridine, 2-ethyl-	1	27.00	27	27
2,5-Cyclohexadiene,1,4-dione,^2,6-bis(1,1-dimethy!	1	13.00	13	13
2-Hexene, 5,5-dimethyl-, (Z)-	2	15.60	22	9.2
2-Octene	1	9.10	9.1	9.1
2-Pentene, 2,3,4-trimethyl-	1	340.00	340	340
2-Propenal, 3-(2,6,6-trimethyl-1-^cyclohexen-1-yl!	1	51.00	51	51
2-Undecene, 5-methyl-	2	10.80	14	7.6
2H-1,2,3-Triazole-4-carboxaldehyde, 2-(2-fluorophe	1	32.00	32	32
3-Hexene, 2,2,5,5-tetramethyl-, (Z)-	1	14.00	14	14
3-Octadecene, (E)-	2	56.50	65	48
4,7-Methano-1H-indene, octahydro-	3	209.67	550	33
4-Hexen-3-one, 4,5-dimethyl-	1	7.80	7.8	7.8
5-Octadecene, (E)-	1	160.00	160	160
Adamantane, 1,3-dimethyl-	1	38.00	45	31
Aromatic Hydrocarbon	12	1354.33	14000	6.8
Azulene	1	21.00	21	21
Benzenamine, 3-methoxy-	1	17.00	17	17
Benzene, (1,1-dimethyl-2-propenyl)-	1	28.00	28	28
Benzene, (1,1-dimethylethyl)methyl-	1	7200.00	7200	7200
Benzene, (1,1-dimethylpropyl)-	1	18.00	18	18
Benzene, 1,2,3,4-tetramethyl-	1	38.00	38	38
Benzene, 1,2,3,5-tetramethyl-	1	14.00	14	14
Benzene, 1,2,4,5-tetramethyl-	1	5400.00	5400	5400
Benzene, 1,3-diethyl-	1	25.00	25	25
Benzene, 1,3-diethyl-5-methyl-	4	3693.75	11000	25
Benzene, 1,4-dimethyl-2-(1-methylethyl)-	1	9700.00	9700	9700
Benzene, 1-(1-methylethenyl)-2-^(1-methylethyl)-	1	350.00	350	350
Benzene, 1-ethyl-2,3-dimethyl-	1	39.00	39	39
Benzene, 1-ethyl-2,4-dimethyl-	1	24.00	24	24
Benzene, 1-ethyl-3,5-dimethyl-	3	99.67	190	24
Benzene, 1-ethyl-4-(1-methylethyl)-	2	23.50	35	12
Benzene, 1-methyl-2-(1-methylethyl)-	1	170.00	170	170
Benzene, 1-methyl-3-(1-methylethyl)-	3	36.50	79	8.5
Benzene, 2-ethyl-1,4-dimethyl-	3	7690.50	23000	7.5
Benzene, 4-ethyl-1,2-dimethyl	1	21.00	21	21
Benzene, diethyl-	1	11.00	11	11
Benzene, ethyl-1,2,4-trimethyl-	1	35.00	35	35
Benzene, methyl(1-methylethyl)-	2	16514.00	33000	28
Benzocycloheptatriene	1	40.00	40	40
Bicyclo[2.2.1]heptan-2-ol, 1,3,3-^trimethyl-	1	10.00	10	10
Bicyclo[2.2.1]heptan-2-one, 1,3,3^-trimethyl-	1	88.00	88	88
Bicyclo[2.2.1]heptan-2-one,^1,7,7-trimethyl-, (1S!	1	450.00	450	450
Bicyclo[3.1.0]hexane, 4-methyl-1-^(1-methylethyl)-	1	120.00	120	120

TABLE B-17
STATISTICAL EVALUATION OF ANALYTES TENTATIVELY IDENTIFIED IN SEDIMENT SAMPLES

Compound Name	Frequency of Detection	Average Result	Maximum Result	Minimum Result
Bicyclo[3.1.1]hept-2-ene,3,6,6-^trimethyl-	2	8.40	9.5	7.3
Bicyclo[4.1.0]heptan-2-one, 3,5,5-^trimethyl-	1	35.00	35	35
Bicyclo[4.1.0]heptan-3-one, 4,7,7-^trimethyl-,[1R!	7	2702.10	18000	5.7
Bicyclo[4.1.0]heptan-3-one,^4,7,7-trimethyl-, [1R!	5	216.20	660	26
Caryophyllene	1	9.30	9.3	9.3
Chlorinated Compound	1	24.00	24	24
Cyclic Hydrocarbon	47	342.71	8000	6
Cyclododecane	3	92.67	210	14
Cycloheptane, methyl-	2	491.50	970	13
Cyclohexane	1	120.00	120	120
Cyclohexane, (1-methylethyl)-	1	9.20	9.2	9.2
Cyclohexane, (1-methylpropyl)-	1	630.00	630	630
Cyclohexane, (2-methylpropyl)-	1	270.00	270	270
Cyclohexane, (4-methylpentyl)-	1	14.00	14	14
Cyclohexane, 1,1-dimethyl-	1	120.00	120	120
Cyclohexane, 1,2,4-trimethyl-	1	150.00	150	150
Cyclohexane, 1,2-diethyl-1-methyl-	5	314.00	840	120
Cyclohexane, 1,2-diethyl-3-methyl-	7	4493.71	26000	33
Cyclohexane, 1,2-dimethyl-, trans-	1	49.00	49	49
Cyclohexane, 1,4-dimethyl-	1	44.00	44	44
Cyclohexane, 1-ethyl-4-methyl-, trans-	1	425.00	690	160
Cyclohexane, 1-ethyl-4-methyl-,^trans-	2	79.75	150	9.5
Cyclohexane, 1-methyl-2-propyl-	1	7.60	7.6	7.6
Cyclohexane, 2,4-diethyl-1-methyl-	3	231.33	650	16
Cyclohexane, 2-butyl-1,1,3-trimethyl-	4	51.00	69	25
Cyclohexane, 2-propenyl-	2	3085.00	6000	170
Cyclohexane, butyl-	1	11000.00	11000	11000
Cyclohexane, hexyl-	1	8.80	8.8	8.8
Cyclohexane, methyl-	4	2602.50	10000	110
Cyclohexane, pentyl-	3	2334.00	6100	52
Cyclohexane, propyl-	2	184.00	310	58
Cyclohexanone, 3-methyl-2-(1-methylethyl)-, cis-tr	1	29.00	29	29
Cyclohexanone, 5-methyl-2-(1-^methylethylidene)-	2	265.00	380	150
Cyclohexanone, 5-methyl-2-(1-methylethenyl)-, tran	1	28.00	28	28
Cyclooctane, 1,4-dimethyl-, cis-	1	90.00	90	90
Cyclooctane, butyl-	1	210.00	210	210
Cyclopentane, (2-methylbutyl)-	1	51.00	51	51
Cyclopentane, (2-methylpropyl)-	1	52.00	52	52
Cyclopentane, 1,1,3-trimethyl-	1	27.00	27	27
Cyclopentane, 1,2-dimethyl-, trans-	1	4200.00	4200	4200
Cyclopentane, 1,2-dimethyl-3-(1-methylethyl)-	1	730.00	730	730
Cyclopentane, 1-methyl-2-propyl-	1	2400.00	2400	2400
Cyclopentane, 1-pentyl-2-propyl-	2	35.00	56	14
Cyclopentane, 2-isopropyl-1,3-^dimethyl-	1	185.00	210	160
Cyclopentanone, 2-methyl-4-^(2-methylpropyl)-	1	180.00	180	180
Cyclopropane, 1-butyl-1-methyl-2-propyl-	1	950.00	950	950
Cyclopropane, 1-butyl-2-pentyl-,^cis-	1	11.00	11	11
Cyclopropene, 1-butyl-2-ethyl-	1	54.00	54	54
Cyclotetradecane	1	20.00	20	20
Decane	1	640.00	640	640
Decane, 2,3,6-trimethyl-	1	71.00	71	71
Decane, 2,3,7-trimethyl-	1	15.00	15	15
Decane, 2,4-dimethyl-	1	20.00	20	20
Decane, 2,9-dimethyl-	1	140.00	140	140
Decane, 3,4-dimethyl-	3	35.47	68	6.4
Decane, 3,8-dimethyl-	1	50.00	50	50
Decane, 3-methyl-	5	96.60	270	15
Decane, 4-methyl-	8	241.59	930	8.3
Decane, 5-propyl-	3	306.17	590	8.5
Disulfide, dimethyl	1	14.00	14	14
Dodecane	10	497.71	2100	11
Dodecane, 2,6,10-trimethyl-	1	140.00	140	140
Dodecane, 2,7,10-trimethyl-	13	306.85	1200	9

TABLE B-17
STATISTICAL EVALUATION OF ANALYTES TENTATIVELY IDENTIFIED IN SEDIMENT SAMPLES

Compound Name	Frequency of Detection	Average Result	Maximum Result	Minimum Result
Dodecane, 4,6-dimethyl-	3	686.67	1600	40
Dodecane, 6-methyl-	2	695.00	850	540
Eicosane	1	9.50	9.5	9.5
Ethanone, 1-(2,3,4-trimethylphenyl)-	1	26.00	26	26
Heptane	2	3984.50	7900	69
Heptane, 2,2-dimethyl-	1	130.00	130	130
Heptane, 2,6-dimethyl-	1	21.00	21	21
Heptane, 3-ethyl-2-methyl-	1	5.90	5.9	5.9
Heptane, 3-ethyl-5-methyl-	4	121.63	260	6.5
Heptane, 4-(1-methylethyl)-	1	820.00	820	820
Heptane, 4-propyl-	1	8.20	8.2	8.2
Heptane, 5-ethyl-2-methyl-	2	156.00	300	12
Hexadecane	4	35.50	92	9.1
Hexadecane, 7,9-dimethyl-	1	31.00	31	31
Hexane	2	1453.25	2900	6.5
Hexane, 2,2,5,5-tetramethyl-	1	19.00	19	19
Hexane, 2,3,4-trimethyl-	2	1377.00	2700	54
Hexane, 2,5-dimethyl-	2	1686.50	3300	73
Hexane, 3-ethyl-4-methyl-	1	46.00	46	46
Hexane, 3-methyl-	2	1672.50	3300	45
Isooctane, (ethenyloxy)-	1	15.00	15	15
Methylamine, N-(1-methylhexylidene)-	1	9.30	9.3	9.3
Naphthalene, 1,3,6-trimethyl-	1	16.00	16	16
Naphthalene, 1,4,5-trimethyl-	1	12.00	12	12
Naphthalene, 1,4,6-trimethyl-	1	12.70	18	7.4
Naphthalene, 2,3-dichloro-	1	7.80	7.8	7.8
Naphthalene, 2,3-dimethyl-	1	9.80	12	7.6
Naphthalene, 2-ethyl-	1	12.00	12	12
Naphthalene, decahydro-	5	3683.20	13000	21
Naphthalene, decahydro-, trans-	3	243.33	350	120
Naphthalene, decahydro-1,5-dimethyl-	2	32.60	59	6.2
Naphthalene, decahydro-2,3-dimethyl-	1	24.00	24	24
Nonadecane	1	10.00	10	10
Nonane	3	2050.00	5800	120
Nonane, 2,3-dimethyl-	2	42.50	69	16
Nonane, 2,6-dimethyl-	5	132.00	260	50
Nonane, 2-methyl-3-methylene	1	300.00	300	300
Nonane, 3,7-dimethyl-	6	72.17	260	6
Nonane, 3-methyl-	3	317.67	740	83
Nonane, 3-methyl-5-propyl-	1	230.00	230	230
Nonane, 4-methyl-5-propyl-	1	140.00	140	140
Nonane, 5-(2-methylpropyl)-	1	1900.00	1900	1900
Octadecane, 5,14-dibutyl-	1	23.00	23	23
Octane	2	3065.00	6000	130
Octane, 2,3,6-trimethyl-	1	6.50	6.5	6.5
Octane, 2,3,7- trimethyl-	1	45.00	45	45
Octane, 2,3,7-trimethyl-	2	430.50	780	81
Octane, 2,5,6-trimethyl-	1	16.00	16	16
Octane, 2,6-dimethyl-	1	7.00	7	7
Octane, 3,3-dimethyl-	3	3113.67	9200	31
Octane, 3,6-dimethyl-	2	42.50	67	18
Octane, 3-ethyl-	2	456.67	790	270
Octane, 6-ethyl-2-methyl-	1	89.00	89	89
Oxygenated Hydrocarbon	6	67.84	330	7.9
Pentadecane	1	14.00	14	14
Pentane, 2,2,3,4-tetramethyl-	1	19.00	19	19
Pentane, 2,3,3-trimethyl-	1	50.00	50	50
Phenol, 2,5-bis(1-methylethyl)-	1	10.00	10	10
Phenol, 2,6-bis(1,1-dimethylethyl)-4-^methyl-	1	7.90	7.9	7.9
Propanal, 2-propenylhydrazone	1	8.80	8.8	8.8
Pulegone	2	13500.00	22000	5000
Saturated Hydrocarbon: <C10	6	143.68	470	6.1
Saturated Hydrocarbon: C10-C20	25	132.64	1300	6.3

TABLE B-17
STATISTICAL EVALUATION OF ANALYTES TENTATIVELY IDENTIFIED IN SEDIMENT SAMPLES

Compound Name	Frequency of Detection	Average Result	Maximum Result	Minimum Result
Siloxane	53	158.74	6700	5.6
Tetradecane	8	431.88	1900	14
Tetradecane, 2-methyl-	1	20.00	20	20
Tricyclo[2.2.1.02,6]heptane, 1,7,7-^trimethyl-	1	38.00	38	38
Tricyclo[3.3.1.13,7]decane, 1-nitro-	1	44.00	44	44
Tridecane	6	432.50	1900	12
Tridecane, 4,8-dimethyl-	1	220.00	220	220
Tridecane, 4-methyl-	1	260.00	260	260
Tridecane, 5-methyl-	1	590.00	590	590
Tridecane, 7-methyl-	3	220.00	360	130
Tridecane, 7-propyl-	1	110.00	110	110
Undecane	6	970.83	4000	41
Undecane, 2,7-dimethyl-	1	33.00	33	33
Undecane, 2,9-dimethyl-	1	780.00	780	780
Undecane, 2-methyl-	1	470.00	470	470
Undecane, 3,6-dimethyl-	6	642.85	2400	8.1
Undecane, 3,8-dimethyl-	5	305.40	990	22
Undecane, 3-ethyl-	1	110.00	110	110
Undecane, 3-methyl-	1	26.00	26	26
Undecane, 4,6-dimethyl-	4	458.00	1200	120
Undecane, 4-methyl-	4	373.75	660	15
Unknown	32	97.87	770	5.8
Unknown Hydrocarbon	5	25.95	89	6.2
Unsaturated Hydrocarbon	35	791.65	20000	6.5
cis-1,2-Dichloroethene	4	148.50	250	54
n-Octacosane	1	13.00	13	13
s-Triazolo[4,3-a]pyrazine, 3-amino-5,8- dimethyl-	1	8.30	8.3	8.3
Semivolatile Organics (ug/kg)				
(+)-(1S,3S)-2,2-Dimethyl-4-^methylidenecyclohexane	1	1700.00	1700	1700
(+,-)- beta.-Himachalene	1	250.00	250	250
(+-)-15-Hexadecanolide	2	375.00	520	230
(13RS)-14,15-Dinorlabdane-8,13-diol	1	400.00	400	400
(17.alpha.H,21.beta.H)-Hopane	1	2100.00	2100	2100
(1R-(1.alpha.,2.beta.,3a.alpha.,^12c.alpha.))-Bis!	1	13000.00	13000	13000
(E)-4-(2',6',6'-Trimethyl-1'-^cyclohexen-1'yl(-3-!	1	180.00	180	180
(E)-4-(2',6',6'-Trimethyl-1'-cyclohexen-1'yl)-3-pe	3	710.00	1100	350
(E)-6-Ethylidene-6H-dibenzo[b,d]thiopyran 5-oxide	1	2100.00	2100	2100
(Z)-4-(2',6',6'-Trimethyl-1'-cyclohexen-1'-cyclohe	1	1400.00	1400	1400
(Z)14-Tricosenyl formate	1	480.00	480	480
.Psi.,.psi.-Carotene, 7,7',8,8',11,^11',12,12',1!	1	420.00	420	420
.delta.-Selinene	1	210.00	210	210
1(2H)-Naphthalenone, octahydro-^8a-methyl-,cis-	1	1100.00	1100	1100
1,1'-Biphenyl, 2,2',3',4,5-^pentachloro-	1	520.00	520	520
1,1'-Biphenyl, 2,2',3,3',4,4'-hexachloro-	1	1100.00	1100	1100
1,1'-Biphenyl, 2,2',3,3',4,5-Hexachloro-	1	740.00	740	740
1,1'-Biphenyl, 2,2',3,4,4',6-hexachloro-	2	1170.00	2600	360
1,1'-Biphenyl, 2,2',3,4,5'-^pentachloro-	1	500.00	500	500
1,1'-Biphenyl, 2,2',3,4,5'-pentachloro-	1	790.00	790	790
1,1'-Biphenyl, 2,2',3,5',6-pentachloro-	1	2200.00	2200	2200
1,1'-Biphenyl, 2,2',4,4',5-^pentachloro-	1	4000.00	4000	4000
1,1'-Biphenyl, 2,2',4,5,5'-pentachloro-	1	2000.00	2000	2000
1,1'-Biphenyl, 2,3,4,4',5-pentachloro-	1	290.00	290	290
1,1'-Biphenyl, pentachloro-	1	2050.00	2900	1200
1,1'-Biphenyl, tetrachloro-	1	1200.00	1200	1200
1,1'-Biphenyl,2,2',4,4',6,6'-^hexachloro-	1	1100.00	1100	1100
1,1'-Biphenyl,2,2',4,4',6-^pentachloro-	1	1200.00	1200	1200
1,1':4',1"-Terphenyl, 2,4,6-^trichloro-	3	1946.25	4100	290
1,1':4',1"-Terphenyl, 2,4,6-trichloro-	3	8079.33	19000	650
1,1-Dichloro-1-sila-2,3-benzophenalane	1	7500.00	7500	7500
1,1-Dimesityl-3-methyl-1-buten-2-ol	1	3000.00	3000	3000
1,12-Benzperylene	1	700.00	700	700
1,2-Benzenedicarboxylic acid, butyl decyl ester	1	2000.00	2000	2000
1,2-Benzenedicarboxylic acid, diheptyl^ester	1	2900.00	2900	2900

TABLE B-17
STATISTICAL EVALUATION OF ANALYTES TENTATIVELY IDENTIFIED IN SEDIMENT SAMPLES

Compound Name	Frequency of Detection	Average Result	Maximum Result	Minimum Result
1,2-Benzenedicarboxylic acid,^bis(8-methylnonyl)!	1	1000.00	1000	1000
1,2-Benzenedicarboxylic acid,^decyl hexyl ester	3	1213.33	2000	540
1,2-Benzenedicarboxylic acid,^diisononyl ester	2	1350.00	1400	1300
1,2-Benzenedicarboxylic acid,^ditridecyl ester	1	2300.00	2300	2300
1,2-Benzopervlene	3	7560.00	14000	980
1,2-Cyclohexanediol	1	410.00	410	410
1,3,2-Dioxaborinane, 2-ethyl-4-^methyl-	1	640.00	640	640
1,3-Cyclohexadiene, 5-(1,5-dimethyl-4-hexenyl)-2-m	2	1325.00	2300	350
1,4-Methanonaphthalene, 1,4-^dihydro-9-phenyl-	1	2200.00	2200	2200
1,6,10-Dodecatriene, 7,11-^dimethyl-3-methylene!	1	240.00	240	240
1,6-Dimethyldibenzothiophene	1	1300.00	1300	1300
1,7-Dimethyldibenzothiophene	2	1710.00	2800	620
1,7-Nonadiene, 4,8-dimethyl-	1	260.00	260	260
1-Azido-1-(p-methoxyphenyl)ethane	1	4500.00	4500	4500
1-Decanol, 2-ethyl-	1	3500.00	3500	3500
1-Docosanol	1	1000.00	1000	1000
1-Dodecanamine, N,N-dimethyl-	2	1205.00	2200	210
1-Eicosanol	3	1540.00	3100	420
1-Eicosene	1	2000.00	2000	2000
1-Eicosyne	1	2000.00	2000	2000
1-Heneicosyl formate	2	1785.00	3100	470
1-Heptadecanol, acetate	1	1800.00	1800	1800
1-Heptadecene	1	420.00	420	420
1-Heptanol, 2,4-dimethyl-, (2S,4R)-(-)-	1	1300.00	1300	1300
1-Hexadecanol	2	1315.00	1700	930
1-Hexadecanol, 2-Methyl-	1	820.00	820	820
1-Hexadecanol, 3,7,11,15-^tetramethyl-	1	390.00	390	390
1-Hexene, 5-methyl-	1	190.00	190	190
1-Methylnaphthalene	2	1420.00	1900	940
1-Naphthaldehyde, (o-nitrophenyl)^hydrazone	1	3200.00	3200	3200
1-Naphthalene, decahydro-4a-methyl-^1-methylene-!	1	200.00	200	200
1-Naphthalenecarboxaldehyde, 2-hydroxy-	1	430.00	430	430
1-Naphthalenepropanol, .alpha.-ethenyldecahydro-5-	1	390.00	390	390
1-Nonadecene	2	545.00	850	240
1-Nonene, 4,6,8-trimethyl-	1	340.00	340	340
1-Octadecene	3	646.67	770	500
1-Pentadecene	1	370.00	370	370
1-Penten-3-one, 2-methyl-	2	255.00	260	250
1-Tetradecanamine, N,N-dimethyl-	1	470.00	470	470
1-Undecene, 4-methyl-	1	270.00	270	270
1-oxo-1,2-dihydro-2,3-diaza^phenoxathiin	1	21000.00	21000	21000
10-Methoxybenz[a]azulen-1,4-dione	2	1800.00	3300	300
10H-Phenothiaphosphine, 7-chloro^-2-fluor-10-hydr!	3	581.25	780	360
11-Methylsqualene	1	270.00	270	270
11-Tricosene	1	1100.00	1100	1100
11H-Benzo[a]fluorene	7	1434.29	3200	200
11H-Benzo[b]fluorene	9	1135.00	3200	240
12-Octadecenal	1	2300.00	2300	2300
12-epi-Teucvin	1	520.00	520	520
13(16),14-Labdien-8-ol	1	260.00	260	260
13-Octadecenal	2	485.00	700	270
14-Octadecenal	2	635.00	970	300
14-Octadecenoic acid, butyl ester	1	300.00	300	300
17-Octadecenal	1	270.00	270	270
17-Pentatriacontene	2	1005.00	1100	910
1H-3a,7-Methanoazulene, 2,3,4,7,8,8a,-hexahydro-3,	1	240.00	240	240
1H-3a,7-Methanoazulene, 2,3,4,7,8,8a,^-hexahydro-!	1	160.00	160	160
1H-Cycloprop[e]azulene, 1a,2,3,4,4a,5,6,7b-octahyd	1	280.00	280	280
1H-Cycloprop[e]azulene, 1a,2,3,4,^4a,-5,6,7b-oct!	1	210.00	210	210
1H-Indene, 5-butyl-6-hexyloctahydro-	1	445.00	460	430
1H-Indene, octahydro-2,2,4,4,7,7-^hexamethyl-	2	880.00	1200	560
1H-Naphtho[2,1-b]pyran, 4a,5,6,6a,^7,8,9,10,10a,1!	1	230.00	230	230
2(1H)-Naphthalenone, 4a,5,6,7,8,8a-^hexahahydro-!	1	920.00	920	920

TABLE B-17
STATISTICAL EVALUATION OF ANALYTES TENTATIVELY IDENTIFIED IN SEDIMENT SAMPLES

Compound Name	Frequency of Detection	Average Result	Maximum Result	Minimum Result
2,2-Dimethyl-2-methylene-1-^(3'-methyl-4'-penteny!	1	1100.00	1100	1100
2,3,6,7-Tetramethylanthracene	1	210.00	210	210
2,4-Pentadienenitrile	1	7900.00	7900	7900
2,5-Furandione, 3-(dodecenyl)dihydro-	5	1280.00	2500	490
2,6-Dipropyl-4-methylpyridine	1	1100.00	1100	1100
2,8-Dimethyldibenzo(B,D)thiophene	1	1700.00	1700	1700
2-(2'-Nitro-2'-propenyl)naphthalene	1	25000.00	25000	25000
2-Butanone, 4-(2,6,6-trimethyl-2-cyclohexen-1-yl)-	1	470.00	470	470
2-Butenal, 3-methyl-	1	430.00	430	430
2-Chloro-4,6-di(4-chlorophenyl)^pyrimidine	1	1600.00	1600	1600
2-Cyclohexen-1-ol, 2-methyl-5-(1-^methylethenyl)-!	1	690.00	690	690
2-Cyclohexen-1-ol, 4-(3,4-dimethoxyphenyl)-4-[2-(m	1	270.00	270	270
2-Cyclohexene-1-carboxaldehyde,^2,6-dimethyl-6-!	1	500.00	500	500
2-Docosene	4	937.50	1500	330
2-Dodecen-1-yl(-)succinic anhydride	2	555.00	850	260
2-Hexen-1-ol, 2-ethyl-	1	170.00	170	170
2-Hexenal diethyl acetal, trans-	1	490.00	490	490
2-Methyl-2,3,4,5,6,7-hexhydro-^1H-2-benzazonine	1	420.00	420	420
2-Methylenehydrazono-3-methyl-^2,3-dihydrobenzothi	1	2200.00	2200	2200
2-Naphthalenol, 1,6-dibromo-	2	1500.00	1700	1300
2-Nonylphenol	1	800.00	800	800
2-Phenanthrenol, 4b,5,6,7,8,8a,9,10-octahydro-4b,8	1	2800.00	2800	2800
2-Phenyl-2-(phenylcarbamoyl)^indan-1,3-dione	1	230.00	230	230
2-Phenyl-6,7-dimethylquinoxaline	1	1700.00	1700	1700
2-Phenylnaphthalene	1	2200.00	2200	2200
2-Propanone, 1-(4-methoxyphenyl)-	1	170.00	170	170
2-Propen-1-one, 1-(2-hydroxyphenyl)-3-^(4-hydrox!	2	3700.00	5400	2000
2-Propenoic acid, 3-[2,3-dihydro-^3-[(4-methoxyph!	1	1600.00	1600	1600
2-Thiazolemethanol, .alpha.-phenyl-	1	3800.00	3800	3800
24.Xi.-Ethylchloest-5-en-3.beta.-ol	1	300.00	300	300
28-Nor-17.alpha.(H)-hopane	15	3130.67	14000	250
28-Nor-17.beta.(H)-hopane	32	5377.50	45000	180
2H-1,2,3-Triazole-4-carboxaldehyde, 2-(2-fluorophe	1	2000.00	2000	2000
2H-pyran-2-carboxylic acid, 3,6-dihydro-6-propoxy-	1	11000.00	11000	11000
3,3-Dimethyl-2-isopropyl-cyclopentane	1	1300.00	1300	1300
3,4-Dihydrocyclopenta(cd)pyrene^(acepyrene)	4	1070.00	2300	190
3,5-Dihydroxytoluene	1	220.00	220	220
3,5-Dimethyl-4-hydroxybenzaldehyde	1	1000.00	1000	1000
3-Fluoranthenamine	4	1616.00	2300	180
3-Hexadecene, (z)-	1	1400.00	1400	1400
3-Octadecene, (E)-	1	1200.00	1200	1200
3-Penten-2-one, 4-methyl-	3	236.67	260	220
3-Piperidinone, 1-methyl-	1	410.00	410	410
3-Pyridinecarbonitrile	1	310.00	310	310
4,(2',6',6'-Trimethylcyclohex-1'yl)^butan-1-ol	1	660.00	660	660
4,7-Methano-1H-indene, octahydro-	1	190.00	190	190
4-Hexenoic acid, 3-methyl-2,6-dioxo-	10	1007.14	1800	220
4-Methylnaphtho[2,1-b]thiophene	1	2300.00	2300	2300
4-Octene, 2,3,6-trimethyl-	1	180.00	180	180
4H-Cyclopenta[def]phenanthrene	18	1405.56	5200	170
4H-Naphtho[2,3,b]pyran-4,6,9-^trione, 5,8-dimetho!	1	1100.00	1100	1100
5,12-Naphthacenedione	2	360.00	450	270
5-Bromovaleronitrile	1	3600.00	3600	3600
5-Hexenoic acid, 5-methyl-	1	390.00	390	390
5-Nonanone, 2,2,8,8-tetramethyl-	1	520.00	520	520
5.alpha.-Ergostan-15-one	2	1775.00	2700	850
5.alpha.-Stigmast-3-one-	8	1432.50	6100	180
6(2H)-Benzofuranone, 2-(1,3-^benzodioxol-5-yl)-3,!	1	7600.00	7600	7600
6-Hydroxymethyl-1,4,4-trimethyl-^bicyclo(3.1.0.)!	1	170.00	170	170
6-Methyl-6-(5'methyl-2'-furyl)^hepta-2,3-dione	1	230.00	230	230
6-Methylchrysene	1	6100.00	6100	6100
6H,8H-Benzo[10,11]chryseno[1,12-cd]^pyran-6,8-dio!	4	3350.00	11000	170
6H-Dibenz[b,f]oxireno[d]azepine-^6-carboxamide,1!	1	490.00	490	490

TABLE B-17
STATISTICAL EVALUATION OF ANALYTES TENTATIVELY IDENTIFIED IN SEDIMENT SAMPLES

Compound Name	Frequency of Detection	Average Result	Maximum Result	Minimum Result
7,11-Dimethyl-3-Methylen-1,6,10-dodecatriene	1	220.00	220	220
7-amino-3-methylpyrimido(4,5-c)pyridazin-5-(6H)-on	1	240.00	240	240
7H-Benz[de]anthracen-7-one	5	1605.71	4300	210
7H-Benzo[c]fluorene	1	1000.00	1000	1000
8,11-Eicosadienoic acid, methyl ester	1	750.00	750	750
8-Heptadecanol, 8-methyl-	2	815.00	930	700
9,10-Anthracenedione	6	1240.00	4300	320
9-Hexadecenoic acid	1	260.00	260	260
9-Octadecenamide, N,N-dimethyl-	1	2100.00	2100	2100
9-Octadecenoic acid (Z)-, methyl^ester	1	290.00	290	290
9-Tricosene, (z)-	2	2560.00	4900	220
Acenaphthylidene, 1,1'-bis-	2	4233.33	9300	2100
Acetamide	1	180.00	180	180
Acetamide, N,N-diethyl-	4	440.00	620	350
Acetic acid, octadecyl ester	1	340.00	340	340
Acridine	1	1900.00	1900	1900
Alcohol	3	200.00	210	190
Alnulin	1	320.00	320	320
Amide	1	1400.00	1400	1400
Androsta-1,4-dien-3-one, 17-hydroxy-^17-methyl-,!	1	170.00	170	170
Anthracene, 2-methyl-	3	926.67	1600	310
Anthracene, 9-dodecyltetradecahydro-	3	4725.00	13000	1100
Anthracene, 9-methyl-	2	435.00	690	180
Aristolone	2	4710.00	9100	320
Aromatic Hydrocarbon	25	1977.94	11000	160
Ascaridole	1	510.00	510	510
Baccharane	2	735.00	1200	270
Benz(a)anthracene,-7,12-dione	2	370.00	460	280
Benz[a]anthracene, 1-methyl-	1	290.00	290	290
Benz[a]anthracene, 3-methyl-	2	1710.00	3000	420
Benz[a]anthracene, 4-methyl-	1	370.00	370	370
Benz[a]anthracene, 7-methyl-	4	1545.00	2600	380
Benz[a]anthracene, 8-methyl-	1	220.00	220	220
Benz[j]aceanthrylene, 3-methyl-	1	4300.00	4300	4300
Benzaldehyde, 4-methyl-, oxime	1	350.00	350	350
Benzaldehyde, ethyl-	1	2700.00	2700	2700
Benzene, (2-bromoethenyl)-	1	850.00	850	850
Benzene, (pentachloroethoxy)-	1	2400.00	2400	2400
Benzene, 1,2,4,5-tetramethyl-	1	590.00	590	590
Benzene, 1-methoxy-4-octyl-	1	490.00	490	490
Benzene, 1-methyl-2-(2-propenyl)-	1	530.00	530	530
Benzene, 2,4-difluoro-1-isocyanato-	1	490.00	490	490
Benzene, [(1,1-dimethylethoxy)methyl]-	1	7800.00	7800	7800
Benzenebutanamine	1	1300.00	1300	1300
Benzenesulfonamide, 2-methyl-	1	650.00	650	650
Benzenesulfonamide, 4-methyl-	2	2800.00	4600	1000
Benzo(a)acridine	1	190.00	190	190
Benzo(a)carbazole	1	1100.00	1100	1100
Benzo(e)pyrene	19	1809.00	9200	170
Benzo[b]naphtho[1,2-d]thiophene	4	2780.00	5900	320
Benzo[b]naphtho[2,3-d]furan	2	840.00	850	830
Benzo[b]naptho[2,1-d]thiophene	5	1340.00	3400	260
Benzo[c]phenanthrene	9	2815.00	9000	190
Benzo[c]phenanthrene, 5-methyl-	1	370.00	370	370
Benzo[ghi]fluoranthene	3	4150.00	9800	450
Benzo[j]fluoranthene	17	2563.48	12000	360
Benzoic acid, 4-(bromomethyl)-	2	300.00	370	230
Benzoyl chloride, 3-fluoro-	1	420.00	420	420
Bicyclo[3.1.1]hept-2-ene, 2,6-^dimethyl-6-(4-methy	1	660.00	660	660
Butanoic acid, 2-butoxy-1-methyl-^2-oxoethyl ester	2	1040.00	1100	980
Butanoic acid, 2-methyl-	1	400.00	400	400
Carbazole	12	1063.33	6400	160
Cedrol	1	6500.00	6500	6500

TABLE B-17
STATISTICAL EVALUATION OF ANALYTES TENTATIVELY IDENTIFIED IN SEDIMENT SAMPLES

Compound Name	Frequency of Detection	Average Result	Maximum Result	Minimum Result
Chlorinated Compound	2	1492.22	2600	510
Chlorinated Hydrocarbon	4	1810.71	14000	290
Cholest-4-en-3-ol, (3.alpha.)-	1	1700.00	1700	1700
Cholest-7-ene-3,6-dione, (5.alpha.)-	1	870.00	870	870
Cholestan-3-one, 4,4-dimethyl-,^(5.alpha.)-	1	1400.00	1400	1400
Cholestan-4-one	1	1000.00	1000	1000
Cholestane	2	1440.00	2600	280
Cholestane, (5.alpha.,14.beta.)-	3	256.67	330	210
Cholestanol	2	2350.00	2500	2200
Cholesterol	13	2249.23	12000	190
Chromone, 3,5-dibromo-6-hydroxy-2-^methyl-	4	823.64	1900	370
Chromone, 3,5-dibromo-6-hydroxy-2-methyl-	1	4000.00	4000	4000
Chrysene, 5-methyl-	1	190.00	190	190
Coronene	1	1400.00	1400	1400
Cyclic Hydrocarbon	18	2327.39	19000	210
Cyclobutanone, 2-(2,6-dimethylheptyl)-	1	1300.00	1300	1300
Cyclododecanemethanol	1	390.00	390	390
Cycloheptadecanol	1	430.00	430	430
Cycloheptanol, 3-(3,3-dimethylbutyl)-	1	2100.00	2100	2100
Cyclohexadecane	2	716.67	1100	320
Cyclohexane, (1,2-dimethylpropyl)-	1	630.00	630	630
Cyclohexane, 1,1'-methylenebis-	1	3400.00	3400	3400
Cyclohexane, 1,2-diethyl-3-methyl-	1	420.00	420	420
Cyclohexane, 1,4-didecyl-	1	1500.00	1500	1500
Cyclohexane, 1-(1,5-dimethylhexyl)-4-(4-methylpent	2	970.00	1300	660
Cyclohexane, 1-(1,5-dimethylhexyl)-^4-(4-methylpe!	2	2100.00	3100	1200
Cyclohexane, 1-methyl-4-(1-^methylbutyl)-	1	1500.00	1500	1500
Cyclohexane, 1-propenyl-	1	5900.00	5900	5900
Cyclohexane, butyl-	1	970.00	970	970
Cyclohexane, decyl-	1	2000.00	2000	2000
Cyclohexane, methyl-	1	170.00	170	170
Cyclohexane, octyl-	1	230.00	230	230
Cyclohexane, pentyl-	1	3000.00	3000	3000
Cyclohexanol, dodecyl-	2	695.00	930	460
Cyclohexene, 5-methyl-3(1-^methylethenyl)-, tran!	1	920.00	920	920
Cyclooctene, 3-(2-propenyl)-	1	1000.00	1000	1000
Cyclopenta(def)phenanthrenone	1	380.00	380	380
Cyclopenta[cd]pyrene	1	910.00	910	910
Cyclopentadecane	2	773.33	1600	330
Cyclopentane, (2-hexyloctyl)-	1	1200.00	1200	1200
Cyclopentane, (2-methylbutyl)-	1	3300.00	3300	3300
Cyclopentane, 1,1,3-trimethyl-3-(2-methyl-2-propen	1	600.00	600	600
Cyclopentane, ethyl-	3	663.33	1300	170
Cyclopentanecarboxylic acid, 2-^amino-, trans-	1	250.00	250	250
Cyclopropane, pentyl-	1	1800.00	1800	1800
Cyclotetracosane	3	783.33	1100	430
Cyclotetradecane	1	620.00	620	620
D-Friedoolean-14-ene, 3-methoxy-, (3.beta.)-	1	400.00	400	400
D-Friedoolean-14-ene, 3-methoxy-,^(3.beta.)-	19	706.84	2100	230
D-Norandrostan-16-one, (5.alpha.)-	1	440.00	520	360
D-Ribofuranose, 5-S-methyl-5-thio-1,2,3-tris-O-(tr	1	930.00	930	930
D:A-Friedooleanan-3-one	4	2080.00	6000	500
Decahydro-4,4,8,9,10-^pentamethylnaphthalene	1	1200.00	1200	1200
Decahydro-4,4,8,9,10-pentamethyl-^naphthalene	1	190.00	190	190
Decane 2-cyclohexyl-, 2-cyclohexyl-	1	1100.00	1100	1100
Desmosterol	1	190.00	190	190
Dibenz(a,c)anthracene	4	8484.29	26000	290
Dibenzo[def,mno]chrysene	4	6335.00	13000	240
Dibenzothiophene	6	1710.00	3100	310
Dibenzothiophene, 3-methyl-	2	2500.00	2700	2300
Diethylphosphinothioic azide	1	1100.00	1100	1100
Dodecane, 1,12-dibromo-	2	935.00	1600	270
Dodecane, 1,2-dibromo-	5	2241.67	3500	950

TABLE B-17
STATISTICAL EVALUATION OF ANALYTES TENTATIVELY IDENTIFIED IN SEDIMENT SAMPLES

Compound Name	Frequency of Detection	Average Result	Maximum Result	Minimum Result
Eicosane	1	180.00	180	180
Ent-10S-15,16-epoxy-19-norcleroda-^4,13(16), 14-!	1	820.00	820	820
Epifriedelinol	2	400.00	430	370
Ergost-5-en-3-ol, (3.beta.)-	4	566.00	1100	300
Ergost-7-en-3-ol, (3.,beta.)-	3	496.67	560	430
Ergosta-14,22-dien-3-ol, (3.beta.,^5.alpha.,22E)-	1	250.00	250	250
Ergosta-5,22-dien-3-ol,^(3.beta.,22E,24S)-	1	780.00	780	780
Ergostanol	5	528.00	1000	310
Ethanamine, 1-(2,4-cyclopentadien-^1-ylidene)-N,N!	1	430.00	430	430
Ethanethioic acid, S,S'-[thiobis^(methylene)] est!	2	715.00	1100	330
Ethanoic acid, S-methyl ester	6	361.67	740	160
Ethanol, 2-(diethylamino)-	1	1000.00	1000	1000
Ethanol, 2-(tetradecyloxy)-	1	2100.00	2100	2100
Ethanol, 2-butoxy-, phosphate (3:1)	1	420.00	420	420
Ethanone, 1-(4-ethoxyphenyl)-	4	656.00	2000	220
Ethynyl (1R*,2R*,5S*)-5,8,8-trimethylbicyclo[3.3.0	1	930.00	930	930
Ethynyl (1R,2R,5S)-5,8,8-^trimethylbicyclo[3.3.0!	1	300.00	300	300
Fumariline	1	240.00	240	240
Furan, 2,3-dihydro-4-(1-methylethyl)-	1	2700.00	2700	2700
Furan, tetrahydro-2-isopentyl-5-propyl-	1	1100.00	1100	1100
Glycerin	5	268.00	390	200
Heneicosane, 11-(1-ethylpropyl)-	1	170.00	170	170
Heptadecane, 2,6-dimethyl-	2	220.00	230	210
Heptanoic acid, 3-nitrophenyl ester	4	1810.00	2700	340
Heptanoic acid, anhydride	4	3012.50	5100	950
Hexacosanolide	1	290.00	290	290
Hexadecane, 1-(ethenyloxy)-	1	530.00	530	530
Hexadecane-1,2-diol	1	2700.00	2700	2700
Hexadecanoic acid	9	333.33	570	160
Hexadecanoic acid, 1-(hydroxymethyl)-^1,2-ethaned!	3	2033.33	3000	1400
Hexadecanoic acid, 2-oxo-, methyl^ester	3	1470.00	1900	910
Hexadecanoic acid, 2-oxy-, methyl ester	1	210.00	210	210
Hexadecanoic acid, butyl ester	3	250.00	290	200
Hexane, 1-isocyano-	1	510.00	510	510
Hexanedioic acid, bis(2-ethylhexyl)^ester	1	1100.00	1100	1100
Hexanedioic acid, dioctyl ester	2	1450.00	1700	1200
Hexanedioic acid, mono(2-^ethylhexyl)ester	2	825.00	1300	350
Hexanoic acid, 2-ethyl-	1	64.00	64	64
Hexanoic acid, 6-(diethoxyphosphinyl)-,^ethyl eth!	1	230.00	230	230
Hop-22(29)-en-3.beta.-ol	1	350.00	350	350
Hydroxylamine, o-decyl-	2	543.33	1100	170
Indeno[2',1':4,5]thieno[3,2-b]thiopyran	2	1935.00	2900	970
Iso-.alpha.-cedren-15-al	1	1170.00	1500	840
Isocopalol .beta.-epoxide	1	25000.00	25000	25000
Isolongifolene	1	3200.00	3200	3200
Methyl trans-2-(3',4'-dimethoxy^phenyl)cyclohex-!	1	430.00	430	430
N,N,N'N'-Tetramethyl[3.3]^paracyclophan-5,8-diami!	1	270.00	270	270
N,N,N'N'-Tetramethyl[3.3]paracyclophan-^5,8-diam!	1	230.00	230	230
N,N-Dimethyl-5-benzyloxypentylamine	1	240.00	240	240
N,N-Dimethyloctylamine	3	430.00	780	240
Naphthalene, 1,2,3,4,4a,5,6,8a-^octahydro-4a,8-di!	1	250.00	250	250
Naphthalene, 1,2,3,4,4a,5,6,8a-octahydro-7-methyl-	1	190.00	190	190
Naphthalene, 1,2,3,4-tetrachloro-	12	1439.55	4100	230
Naphthalene, 1,2,3,4-tetrahydro-^1-phenyl	1	360.00	360	360
Naphthalene, 1,2,3,5,6,7,8,8a-^octahydro-1,8a-di!	4	913.33	3000	170
Naphthalene, 1,2,3,5,6,7,8,8a-octahydro-^1,8a-di!	2	753.33	1400	290
Naphthalene, 1,2-dichloro-	1	1800.00	1800	1800
Naphthalene, 1,2-dimethyl-	1	930.00	930	930
Naphthalene, 1,3,5,7-tetrachloro-	5	1015.00	1900	350
Naphthalene, 1,3,7-trichloro-	14	2446.43	12000	370
Naphthalene, 1,3-dimethyl-	1	1200.00	1200	1200
Naphthalene, 1,4,6,7-tetrachloro-	10	1676.84	7100	260
Naphthalene, 1,4,6-trimethyl-	1	1600.00	1600	1600

TABLE B-17
STATISTICAL EVALUATION OF ANALYTES TENTATIVELY IDENTIFIED IN SEDIMENT SAMPLES

Compound Name	Frequency of Detection	Average Result	Maximum Result	Minimum Result
Naphthalene, 1,4-dichloro-	1	1000.00	1000	1000
Naphthalene, 1,5-dichloro-	2	1185.00	1900	470
Naphthalene, 2,3,6-trichloro-	2	6300.00	9500	3100
Naphthalene, 2,3,6-trimethyl-	1	1500.00	1500	1500
Naphthalene, 2,3-dichloro-	4	870.00	2100	310
Naphthalene, 2,3-dimethyl-	3	1933.33	2400	1400
Naphthalene, 2,7-dichloro-	1	1000.00	1000	1000
Naphthalene, 2-(phenylmethyl)-	1	1900.00	1900	1900
Naphthalene, 2-phenyl-	2	1600.00	2100	1100
Naphthalene, decahydro-, trans-	1	4600.00	4600	4600
Naphthalene, decahydro-2,6-dimethyl-^3-octyl-	1	180.00	180	180
Naphthalene, decahydro-2-methyl-	5	921.43	1600	240
Naphthalene, heptachloro-	4	857.50	1300	350
Nitrogen compound	4	7365.00	28000	300
Nonadecane, 2,3-dimethyl-	2	2400.00	4300	500
Nonane, 1,9-dibromo-	1	1200.00	1200	1200
Nonane, 1-bromo-	1	900.00	900	900
Nonane, 1-iodo-	4	500.00	600	350
Nonane, 2-bromo-5-ethyl-	1	490.00	490	490
Nonane, 2-methyl-3-methylene-	1	920.00	920	920
Octadecanal	7	830.00	1500	240
Octadecanoic acid	1	200.00	200	200
Octadecanoic acid, 2-methylpropyl^ester	2	2000.00	2200	1800
Octadecanoic acid, 2-oxo-, methyl ester	1	1000.00	1000	1000
Octadecanoic acid, butyl ester	6	1046.67	3500	190
Octanethioic acid, S-hexyl ester	1	320.00	320	320
Octanoic acid, 1-methyltridecyl ester	2	625.00	930	320
Olean-12-ene	1	7000.00	7000	7000
Olean-12-ene, 3-methoxy-, (3.beta.)-	1	370.00	370	370
Oleic Acid	2	625.00	910	340
Oleic acid, 3-(octadecyloxy)propyl ester	2	760.00	900	620
Oleic acid, 3-(octadecyloxy)propyl^ester	2	405.00	430	380
Osthole	1	170.00	170	170
Oxirane, 2,2'-[1,4-butanediylbis(oxymethylene)]bis	1	1700.00	1700	1700
Oxirane, Tetradecyl-	1	1200.00	1200	1200
Oxirane, hexadecyl-	1	620.00	620	620
Oxygenated Hydrocarbon	40	2229.61	17000	180
P-Terphenyl, 2,4,4",6-tetrachloro-	4	3540.00	7500	660
P-Terphenyl, 2,5-dichloro-	3	3480.00	10000	450
Pentacene	1	12000.00	12000	12000
Pentadecanal	1	370.00	370	370
Pentalene, octahydro-1-(2-octyldecyl)-	10	1475.00	3000	190
Pentane, 3-ethyl-2,3-dimethyl-	1	260.00	260	260
Pentanoic acid, 2,2-dimethyl-, ethenyl ester	2	3300.00	4300	2300
Pentanoic acid, 2,2-dimethyl-,^ethenyl ester	1	400.00	400	400
Pentanoic acid, 2-methyl-,anhydride	1	2300.00	2300	2300
Perylene	15	3661.67	17000	250
Phenanthrene, 2-methyl-	1	2100.00	2100	2100
Phenanthrene, 9-dodecyltetradecahydro-	2	310.00	330	290
Phenanthrene, 9-methyl-	2	545.00	740	350
Phenanthro[4,5-bcd]thiophene	1	2700.00	2700	2700
Phenazine, 2-amino-8-methoxy-	1	200.00	200	200
Phenol, 2,4-bis(1-methylethyl)-	1	200.00	200	200
Phenol, 2-(1,1-dimethylethyl)-3-`methyl-	1	400.00	400	400
Phenol, 2-(1,1-dimethylethyl)-4-`methyl-	3	1823.33	3400	170
Phenol, 2-(1,1-dimethylethyl)-5-`methyl-	2	1700.00	2100	1300
Phenol, 2-amino-	1	620.00	620	620
Phenol, 4-(1,1,3,3-tetramethylbutyl)-	18	2230.40	12000	190
Phenol, 4-(2,2,3,3,-tetramethylbutyl)-	5	1310.00	4400	380
Phenol, 4-(2,2,3,3-tetramethylbutyl)-	8	1880.00	4300	180
Phenol, 4-4'-(1,2-diethyl-1,2-`ethanediyl)bis-	1	960.00	960	960
Phenol, 4-nonyl-	7	2728.89	5700	160
Phenol, nonyl-	21	1662.65	6000	170

TABLE B-17
STATISTICAL EVALUATION OF ANALYTES TENTATIVELY IDENTIFIED IN SEDIMENT SAMPLES

Compound Name	Frequency of Detection	Average Result	Maximum Result	Minimum Result
Phosphine sulfide, triphenyl-	6	356.67	490	210
Phosphoric acid, 2-ethylhexyl diphenyl ester	4	575.00	1200	220
Phosphoric acid, 2-ethylhexyl^diphenyl ester	8	1170.00	2500	380
Phosphoric acid, octyl diphenyl ester	2	1960.00	3500	420
Phthalate	8	8885.71	41000	200
Phthalic acid, didecyl ester	4	3945.00	11000	430
Phthalic acid, diisooctyl ester	1	3400.00	3400	3400
Polycyclic Hydrocarbon	6	624.29	2300	200
Polynuclear Aromatic Hydrocarbon	34	3449.28	27000	190
Prasterone	1	450.00	450	450
Propanoic acid	1	430.00	430	430
Propanoic acid, anhydride	1	2600.00	2600	2600
Propanoyl chloride, 2,2-dichloro-	1	1500.00	1500	1500
Propoxyphene	1	440.00	440	440
Pyrazine, 2,5-diethyl-	1	210.00	210	210
Pyrene, 1,3-dimethyl-	2	755.00	1200	310
Pyrene, 1-methyl-	3	3876.67	10000	230
Pyrene, 2-methyl-	2	176.67	200	160
Pyrene, 4-methyl-	1	720.00	720	720
Saturated Hydrocarbon: <C10	3	2452.22	5100	340
Saturated Hydrocarbon: >C20	79	3116.86	33000	150
Saturated Hydrocarbon: C10-C20	62	1774.13	40000	150
Silicic acid (H4SIO4), tetrakis(2-ethylbutyl) este	1	220.00	220	220
Silicic acid (H4SIO4), tetrakis^(2-ethylbutyl) es!	1	880.00	880	880
Siloxane	33	2539.46	17000	160
Squalene	2	355.00	380	330
Stannane, bromodibutyl(1-methylethyl)-	3	503.33	1000	170
Stannane, bromotributyl-	2	565.00	970	160
Stannane, chlorotris(2-methylpropyl)-	6	786.67	2200	250
Stannane, tributylchloro-	4	1047.50	2800	350
Sterol	3	740.00	1400	410
Stigmast-4-en-3-one	13	1346.92	5000	170
Stigmast-5-en-3-ol-, (3.beta.,24S)-	21	2576.19	29000	210
Stigmasta-4,22-dien-3-one	1	1600.00	1600	1600
Stigmastane	7	3992.50	8800	400
Stigmasterol	5	808.00	1300	270
Sulfur	3	3226.67	6300	180
Sulfur, mol. (S8)	8	1166.00	7000	180
Tacamonine	1	410.00	410	410
Tetradecanal	2	575.00	740	410
Tetradecane, 1-chloro-	1	1800.00	1800	1800
Tetradecanoic acid	1	390.00	390	390
Tetradecanoic acid, eicosyl ester	1	1600.00	1600	1600
Thiophene, 2-heptadecyl-	1	2900.00	2900	2900
Thiourea, N-methyl-N,N'-diphenyl-	1	190.00	190	190
Tricyclo[4.3.0.07,9]nonane, 2,2,^5,5,8,8-hexamet!	4	1987.50	5900	190
Tridecanal	1	2000.00	2000	2000
Tridecane 7-cyclohexyl-, 7-cyclohexyl-	2	2750.00	4200	1300
Triphenylene	2	2000.00	2900	1100
Undecanal, 2-methyl-	1	590.00	590	590
Undecane, 2-methyl-	1	170.00	170	170
Unknown	6	6503.33	54000	220
Unsaturated Hydrocarbon	3	397.50	740	200
Urs-20-en-16-ol, (16.beta.,18 ^alpha.,19.alpha.)-	2	3816.67	11000	220
Urs-20-en-16-ol, (16.beta.,18.alpha.,19.alpha.)-	1	940.00	940	940
Valerophenone, 2'-(trimethylsiloxy)-	1	230.00	230	230
Vitamin E	7	5158.57	14000	290
Xylofuranose, 1,2-O-isopropylidene-^4-thio-, .alp!	1	180.00	180	180
Zinc, bis[2-(1,1-dimethylethyl)-^3,3-dimethylcycl!	1	3800.00	3800	3800
[4aS-(4a.alpha.,4b.beta.,7.alpha.^,8.alpha.,8a.al!	1	510.00	510	510
a'-Neogammacer-22(29)-en-3-ol,^(3.beta.,21.beta.)-	3	392.50	500	270
d-Dihomoandrostane, (5.alpha.)-	1	2200.00	2200	2200
d-Galactitol, 2-(acetylmethylamino)-^2-deoxy-3,4,!	1	290.00	290	290

TABLE B-17
STATISTICAL EVALUATION OF ANALYTES TENTATIVELY IDENTIFIED IN SEDIMENT SAMPLES

Compound Name	Frequency of Detection	Average Result	Maximum Result	Minimum Result
d-Homoandrostane, (5.alpha.,13.^alpha.)-	2	1195.00	2100	290
n-Octacosane	1	1900.00	1900	1900
n-Pentadecylcyclohexane	1	360.00	360	360
p-tert-Amyl phenoxy ethanol	1	180.00	180	180

TABLE B-18
MAXIMUM DETECTED CONCENTRATIONS AND ASSOCIATED SAMPLE LOCATIONS
FOR TENTATIVELY IDENTIFIED COMPOUNDS IN SEDIMENT SAMPLES

Compound Name	Client Description	Maximum Result	Date Collected	Foot-notes	Detection Limit	% Water
Volatile Organics (ug/kg)						
1,2-Dichlorobenzene	SC-QW04-SD-103	24	11/03/94	3	3.6	18
1,2-Dichloroethene ^(cis)	SC-QW04-SD-202	39	01/16/95	3	4.5	34
1,3-Dichlorobenzene	SC-QW04-SD-103	13	11/03/94	3	3.6	18
1,4-Dichlorobenzene	SC-QE08-SD-102	150	11/01/94	1	1.5	33
1-Chloronaphthalene	SC-QE08-SD-102	640	11/01/94	2	3.0	33
1-Decene, 4-methyl-	SC-QE06-SD-203	51	01/18/95	1	1.3	20
1-Heptanol, 2-propyl-	SC-QE06-SD-401	100	07/12/95	1	3.3	70
1-Heptene, 2-isohexyl-6-methyl-	SC-QE03-SD-402	7.5	07/12/95	1	1.2	13
1-Hexanol, 2-ethyl-	SC-QE09-SD-301	76	04/11/95	1	1.5	34
1-Hexene, 5,5-dimethyl-	SC-QW04-SD-103	15	11/03/94	1	1.2	18
1-Pentene, 2,4,4-trimethyl-	SC-QW03-SD-101	510	11/03/94	1	1.3	23
1-Pentene, 3,4-dimethyl-	SC-QW04-SD-302	53	04/13/95	1	1.3	20
1-Tridecene	SC-QE08-SD-201	450	01/18/95	1	1.9	48
1-Undecene	SC-QE09-SD-302	35	04/11/95	1	1.3	23
1-Undecene, 5-methyl-	SC-QE06-SD-401	320	07/12/95	1	3.3	70
1H-3a,7-Methanoazulene, 2,3,4,7,8,8a,-hexahydro-3,	SC-QW01-SD-103	6.9	11/03/94	1	1.1	12
1H-Indene, 2,3-dihydro-4,7-dimethyl-	SC-QE06-SD-402	28	07/12/95	1	1.3	23
1H-Indene, octahydro-2,2,4,4,7,7-^hexamethyl-	SC-QE08-SD-401	120	07/11/95	1	1.9	47
1H-Pyrrolo[2,3-b]pyridine, 2-^(1-methylethyl)-	SC-QE06-SD-402	28	07/12/95	1	1.3	23
1H-Pyrrolo[2,3-b]pyridine, 2-ethyl-	SC-QE06-SD-402	27	07/12/95	1	1.3	23
2,5-Cyclohexadiene,1,4-dione,^2,6-bis(1,1-dimethyl	SC-TR01-SD-202	13	01/17/95	1z	1.2	17
2-Hexene, 5,5-dimethyl-, (Z)-	SC-QE09-SD-303	22	04/11/95	1	1.2	19
2-Octene	SC-QE10-SD-301	9.1	04/11/95	1	1.2	20
2-Pentene, 2,3,4-trimethyl-	SC-QW03-SD-101	340	11/03/94	1	1.3	23
2-Propenal, 3-(2,6,6-trimethyl-1-^cyclohexen-1-yl!	SC-QW02-SD-303	51	04/14/95	1z	1.4	26
2-Undecene, 5-methyl-	SC-QE03-SD-101	14	11/02/94	1	1.2	13
2H-1,2,3-Triazole-4-carboxaldehyde, 2-(2-fluorophe	SC-QW04-SD-102	32	11/03/94	1	1.4	26
3-Hexene, 2,2,5,5-tetramethyl-, (Z)-	SC-QE03-SD-101	14	11/02/94	1	1.2	13
3-Octadecene, (E)-	SC-QE06-SD-401	65	07/12/95	1	3.3	70
4,7-Methano-1H-indene, octahydro-	SC-QW05-SD-401	550	07/10/95	1	1.2	16
4-Hexen-3-one, 4,5-dimethyl-	SC-QE06-SD-403	7.8	07/12/95	1	1.2	18
5-Octadecene, (E)-	SC-QE09-SD-401	160	07/11/95	1	1.3	21
Adamantane, 1,3-dimethyl-	SC-QW02-SD-303	45	04/14/95	1	1.4	26
Aromatic Hydrocarbon	SC-QE08-SD-301	14000	04/12/95			57
Azulene	SC-QE10-SD-401	21	07/11/95	1	1.2	18
Benzenamine, 3-methoxy-	SC-QW02-SD-303	17	04/14/95	1	1.4	26
Benzene, (1,1-dimethyl-2-propenyl)-	SC-QE06-SD-402	28	07/12/95	1	1.3	23
Benzene, (1,1-dimethylethyl)methyl-	SC-QE08-SD-301	7200	04/12/95	1	2.3	57
Benzene, (1,1-dimethylpropyl)-	SC-QE09-SD-402	18	07/11/95	1	1.2	17
Benzene, 1,2,3,4-tetramethyl-	SC-QE06-SD-302	38	04/12/95	1	1.3	26
Benzene, 1,2,3,5-tetramethyl-	SC-QE07-SD-202	14	01/18/95	1	1.3	22
Benzene, 1,2,4,5-tetramethyl-	SC-QE08-SD-202	5400	01/18/95	1	1.3	22
Benzene, 1,3-diethyl-	SC-QE06-SD-402	25	07/12/95	1	1.3	23
Benzene, 1,3-diethyl-5-methyl-	SC-QE08-SD-301	11000	04/12/95	1	2.3	57
Benzene, 1,4-dimethyl-2-(1-methylethyl)-	SC-QE08-SD-301	9700	04/12/95	1	2.3	57
Benzene, 1-(1-methylethenyl)-2-^(1-methylethyl)-	SC-QE09-SD-403	350	07/11/95	1	1.2	18
Benzene, 1-ethyl-2,3-dimethyl-	SC-QE07-SD-201	39	01/18/95	2	3.1	36
Benzene, 1-ethyl-2,4-dimethyl-	SC-QE01-SD-201	24	01/19/95	1	1.2	17
Benzene, 1-ethyl-3,5-dimethyl-	SC-QW03-SD-101	190	11/03/94	1	1.3	23
Benzene, 1-ethyl-4-(1-methylethyl)-	SC-QE06-SD-402	35	07/12/95	1	1.3	23
Benzene, 1-methyl-2-(1-methylethyl)-	SC-QW02-SD-301	170	04/14/95	2	3.9	49
Benzene, 1-methyl-3-(1-methylethyl)-	SC-QW04-SD-101	79	11/03/94	2	3.1	36
Benzene, 2-ethyl-1,4-dimethyl-	SC-QE08-SD-301	23000	04/12/95	1	2.3	57
Benzene, 4-ethyl-1,2-dimethyl	SC-QE01-SD-201	21	01/19/95	1	1.2	17
Benzene, diethyl-	SC-QE11-SD-402	11	07/11/95	1	1.1	11
Benzene, ethyl-1,2,4-trimethyl-	SC-QE01-SD-201	35	01/19/95	1	1.2	17
Benzene, methyl(1-methylethyl)-	SC-QE08-SD-301	33000	04/12/95	1	2.3	57
Benzocycloheptatriene	SC-QE06-SD-402	40	07/12/95	1	1.3	23
Bicyclo[2.2.1]heptan-2-ol, 1,3,3-^trimethyl-	SC-QW04-SD-101	10	11/03/94	1	1.6	36
Bicyclo[2.2.1]heptan-2-one, 1,3,3^-trimethyl-	SC-QW04-SD-101	88	11/03/94	2	3.1	36

TABLE B-18
MAXIMUM DETECTED CONCENTRATIONS AND ASSOCIATED SAMPLE LOCATIONS
FOR TENTATIVELY IDENTIFIED COMPOUNDS IN SEDIMENT SAMPLES

Compound Name	Client Description	Maximum Result	Date Collected	Foot-notes	Detection Limit	% Water
Bicyclo[2.2.1]heptan-2-one,^1,7,7-trimethyl-, (1S!	SC-QE09-SD-403	450	07/11/95	1z	1.2	18
Bicyclo[3.1.0]hexane, 4-methyl-1-^(1-methylethyl)-	SC-QW04-SD-101	120	11/03/94	1	1.6	36
Bicyclo[3.1.1]hept-2-ene,3,6,6-^trimethyl-	SC-QW04-SD-103	9.5	11/03/94	1	1.2	18
Bicyclo[4.1.0]heptan-2-one, 3,5,5-^trimethyl-	SC-QE03-SD-301	35	04/13/95	1	1.2	19
Bicyclo[4.1.0]heptan-3-one, 4,7,7-^trimethyl-,[1R!	SC-QE08-SD-301	18000	04/12/95	1z	2.3	57
Bicyclo[4.1.0]heptan-3-one,^4,7,7-trimethyl-, [1R!	SC-QE08-SD-302	660	04/12/95	1z	1.3	23
Caryophyllene	SC-QW05-SD-101	9.3	11/03/94	1	1.1	10
Chlorinated Compound	SC-QW04-SD-103	24	11/03/94			18
cis-1,2-Dichloroethene	SC-QW04-SD-102	250	11/03/94	3	4.1	26
Cyclic Hydrocarbon	SC-QE08-SD-202	8000	01/18/95			22
Cyclododecane	SC-QE01-SD-301	210	04/13/95	1	1.1	12
Cycloheptane, methyl-	SC-QE08-SD-102	970	11/01/94	1	1.5	33
Cyclohexane	SC-QE04-SD-301	120	04/13/95	1	1.2	19
Cyclohexane, (1-methylethyl)-	SC-QE03-SD-101	9.2	11/02/94	1	1.2	13
Cyclohexane, (1-methylpropyl)-	SC-QE08-SD-102	630	11/01/94	1	1.5	33
Cyclohexane, (2-methylpropyl)-	SC-QE08-SD-102	270	11/01/94	1	1.5	33
Cyclohexane, (4-methylpentyl)-	SC-QE10-SD-102	14	11/01/94	1	1.2	19
Cyclohexane, 1,1-dimethyl-	SC-QE09-SD-401	120	07/11/95	1	1.3	21
Cyclohexane, 1,2,4-trimethyl-	SC-QE09-SD-401	150	07/11/95	2	2.5	21
Cyclohexane, 1,2-diethyl-1-methyl-	SC-QE08-SD-402	840	07/11/95	1	1.5	33
Cyclohexane, 1,2-diethyl-3-methyl-	SC-QE08-SD-301	26000	04/12/95	1	2.3	57
Cyclohexane, 1,2-dimethyl-, trans-	SC-QW04-SD-302	49	04/13/95	2	2.5	20
Cyclohexane, 1,4-dimethyl-	SC-QW04-SD-302	44	04/13/95	1	1.3	20
Cyclohexane, 1-ethyl-4-methyl-, trans-	SC-QE08-SD-102	690	11/01/94	1	1.5	33
Cyclohexane, 1-ethyl-4-methyl-,^trans-	SC-QE09-SD-401	150	07/11/95	2	2.5	21
Cyclohexane, 1-methyl-2-propyl-	SC-QE03-SD-101	7.6	11/02/94	1	1.2	13
Cyclohexane, 2,4-diethyl-1-methyl-	SC-QE08-SD-102	650	11/01/94	1	1.5	33
Cyclohexane, 2-butyl-1,1,3-trimethyl-	SC-QE02-SD-302	69	04/13/95	1	1.4	26
Cyclohexane, 2-propenyl-	SC-QW04-SD-303	6000	04/13/95	1	1.3	21
Cyclohexane, butyl-	SC-QE08-SD-301	11000	04/12/95	1	2.3	57
Cyclohexane, hexyl-	SC-QE06-SD-403	8.8	07/12/95	1	1.2	18
Cyclohexane, methyl-	SC-QW04-SD-303	10000	04/13/95	2	2.5	21
Cyclohexane, pentyl-	SC-QE08-SD-202	6100	01/18/95	1	1.3	22
Cyclohexane, propyl-	SC-QE08-SD-102	310	11/01/94	1	1.5	33
Cyclohexanone, 3-methyl-2-(1-methylethyl)-, cis-tr	SC-QE09-SD-102	29	11/01/94	1	1.3	22
Cyclohexanone, 5-methyl-2-(1-^methylethylidene)-	SC-QE02-SD-302	380	04/13/95	1	1.4	26
Cyclohexanone, 5-methyl-2-(1-methylethenyl)-, tran	SC-QE09-SD-101	28	11/01/94	1	1.3	23
Cyclooctane, 1,4-dimethyl-, cis-	SC-QE01-SD-301	90	04/13/95	1	1.1	12
Cyclooctane, butyl-	SC-QE08-SD-102	210	11/01/94	1	1.5	33
Cyclopentane, (2-methylbutyl)-	SC-QE04-SD-301	51	04/13/95	1	1.2	19
Cyclopentane, (2-methylpropyl)-	SC-QE04-SD-301	52	04/13/95	1	1.2	19
Cyclopentane, 1,1,3-trimethyl-	SC-QE09-SD-101	27	11/01/94	1	1.3	23
Cyclopentane, 1,2-dimethyl-, trans-	SC-QW04-SD-303	4200	04/13/95	2	2.5	21
Cyclopentane, 1,2-dimethyl-3-(1-methylethyl)-	SC-QE08-SD-102	730	11/01/94	1	1.5	33
Cyclopentane, 1-methyl-2-propyl-	SC-QW04-SD-303	2400	04/13/95	1	1.3	21
Cyclopentane, 1-pentyl-2-propyl-	SC-QE01-SD-301	56	04/13/95	1	1.1	12
Cyclopentane, 2-isopropyl-1,3-^dimethyl-	SC-QE01-SD-301	210	04/13/95	1	1.1	12
Cyclopentanone, 2-methyl-4-^(2-methylpropyl)-	SC-QE06-SD-401	180	07/12/95	1	3.3	70
Cyclopropane, 1-butyl-1-methyl-2-propyl-	SC-QE08-SD-402	950	07/11/95	1	1.5	33
Cyclopropane, 1-butyl-2-pentyl-,^cis-	SC-QE09-SD-201	11	01/18/95	1	1.2	14
Cyclopropene, 1-butyl-2-ethyl-	SC-QW04-SD-302	54	04/13/95	1	1.3	20
Cyclotetradecane	SC-QE10-SD-402	20	07/11/95	1	1.2	18
Decane	SC-QW03-SD-101	640	11/03/94	1	1.3	23
Decane, 2,3,6-trimethyl-	SC-QE09-SD-303	71	04/11/95	1	1.2	19
Decane, 2,3,7-trimethyl-	SC-QE09-SD-402	15	07/11/95		1.2	17
Decane, 2,4-dimethyl-	SC-QE09-SD-303	20	04/11/95	1	1.2	19
Decane, 2,9-dimethyl-	SC-QE11-SD-301	140	04/11/95	1	1.4	28
Decane, 3,4-dimethyl-	SC-QE01-SD-301	68	04/13/95	1	1.1	12
Decane, 3,8-dimethyl-	SC-QE06-SD-302	50	04/12/95	1	1.3	26
Decane, 3-methyl-	SC-QE08-SD-402	270	07/11/95	1	1.5	33
Decane, 4-methyl-	SC-QE08-SD-102	930	11/01/94	1	1.5	33

TABLE B-18
MAXIMUM DETECTED CONCENTRATIONS AND ASSOCIATED SAMPLE LOCATIONS
FOR TENTATIVELY IDENTIFIED COMPOUNDS IN SEDIMENT SAMPLES

Compound Name	Client Description	Maximum Result	Date Collected	Foot-notes	Detection Limit	% Water
Decane, 5-propyl-	SC-QE08-SD-101	590	11/01/94	1	2.5	61
Disulfide, dimethyl	SC-QE09-SD-402	14	07/11/95	2	2.4	17
Dodecane	SC-QE08-SD-302	2100	04/12/95	2	2.6	23
Dodecane, 2,6,10-trimethyl-	SC-QE06-SD-401	140	07/12/95	1	3.3	70
Dodecane, 2,7,10-trimethyl-	SC-QE08-SD-302	1200	04/12/95	1	1.3	23
Dodecane, 4,6-dimethyl-	SC-QE08-SD-302	1600	04/12/95	2	2.6	23
Dodecane, 6-methyl-	SC-QE08-SD-101	850	11/01/94	1	2.5	61
Eicosane	SC-QE09-SD-201	9.5	01/18/95	1	1.2	14
Ethanone, 1-(2,3,4-trimethylphenyl)-	SC-QE06-SD-403	26	07/12/95	1	1.2	18
Heptane	SC-QW04-SD-303	7900	04/13/95	2	2.5	21
Heptane, 2,2-dimethyl-	SC-QE02-SD-302	130	04/13/95	1	1.4	26
Heptane, 2,6-dimethyl-	SC-QE03-SD-301	21	04/13/95	1	1.2	19
Heptane, 3-ethyl-2-methyl-	SC-QE03-SD-402	5.9	07/12/95	1	1.2	13
Heptane, 3-ethyl-5-methyl-	SC-QE08-SD-401	260	07/11/95	1	1.9	47
Heptane, 4-(1-methylethyl)-	SC-QE08-SD-102	820	11/01/94	1	1.5	33
Heptane, 4-propyl-	SC-QE03-SD-101	8.2	11/02/94	1	1.2	13
Heptane, 5-ethyl-2-methyl-	SC-QE11-SD-301	300	04/11/95	1	1.4	28
Hexadecane	SC-QE09-SD-302	92	04/11/95			23
Hexadecane, 7,9-dimethyl-	SC-QE09-SD-102	31	11/01/94	1	1.3	22
Hexane	SC-QW04-SD-303	2900	04/13/95	3	3.8	21
Hexane, 2,2,5,5-tetramethyl-	SC-QE03-SD-301	19	04/13/95	1	1.2	19
Hexane, 2,3,4-trimethyl-	SC-QW04-SD-303	2700	04/13/95	2	2.5	21
Hexane, 2,5-dimethyl-	SC-QW04-SD-303	3300	04/13/95	1	1.3	21
Hexane, 3-ethyl-4-methyl-	SC-QE03-SD-301	46	04/13/95	1	1.2	19
Hexane, 3-methyl-	SC-QW04-SD-303	3300	04/13/95	2	2.5	21
Isooctane, (ethenyloxy)-	SC-QE02-SD-401	15	07/12/95	1	1.2	20
Methylamine, N-(1-methylhexylidene)-	SC-QE03-SD-402	9.3	07/12/95	1	1.2	13
n-Octacosane	SC-QE03-SD-101	13	11/02/94	1	1.2	13
Naphthalene, 1,3,6-trimethyl-	SC-TR01-SD-202	16	01/17/95	1	1.2	17
Naphthalene, 1,4,5-trimethyl-	SC-TR01-SD-202	12	01/17/95	1	1.2	17
Naphthalene, 1,4,6-trimethyl-	SC-TR01-SD-202	18	01/17/95	1	1.2	17
Naphthalene, 2,3-dichloro-	SC-QE05-SD-201	7.8	01/19/95	1	1.2	16
Naphthalene, 2,3-dimethyl-	SC-TR01-SD-202	12	01/17/95	1	1.2	17
Naphthalene, 2-ethyl-	SC-TR01-SD-202	12	01/17/95	1	1.2	17
Naphthalene, decahydro-	SC-QE08-SD-301	13000	04/12/95	1	2.3	57
Naphthalene, decahydro-, trans-	SC-QE06-SD-301	350	04/12/95	1	1.7	41
Naphthalene, decahydro-1,5-dimethyl-	SC-QE04-SD-301	59	04/13/95	1	1.2	19
Naphthalene, decahydro-2,3-dimethyl-	SC-QE02-SD-401	24	07/12/95	1	1.2	20
Nonadecane	SC-QE06-SD-101	10	11/02/94	1	1.3	21
Nonane	SC-QW04-SD-303	5800	04/13/95	1	1.3	21
Nonane, 2,3-dimethyl-	SC-QE06-SD-401	69	07/12/95	1	3.3	70
Nonane, 2,6-dimethyl-	SC-QE02-SD-301	260	04/13/95	1	1.7	42
Nonane, 2-methyl-3-methylene	SC-QE09-SD-403	300	07/11/95	1	1.2	18
Nonane, 3,7-dimethyl-	SC-QE06-SD-301	260	04/12/95	1	1.7	41
Nonane, 3-methyl-	SC-QE08-SD-102	740	11/01/94	1	1.5	33
Nonane, 3-methyl-5-propyl-	SC-QE02-SD-301	230	04/13/95	1	1.7	42
Nonane, 4-methyl-5-propyl-	SC-QE09-SD-301	140	04/11/95	1	1.5	34
Nonane, 5-(2-methylpropyl)-	SC-QE08-SD-302	1900	04/12/95	1	1.3	23
Octadecane, 5,14-dibutyl-	SC-QE09-SD-303	23	04/11/95	1	1.2	19
Octane	SC-QW04-SD-303	6000	04/13/95	1	1.3	21
Octane, 2,3,6-trimethyl-	SC-TR01-SD-303	6.5	04/11/95	1	1.3	21
Octane, 2,3,7- trimethyl-	SC-QE09-SD-101	45	11/01/94	1	1.3	23
Octane, 2,3,7-trimethyl-	SC-QE06-SD-301	780	04/12/95	1	1.7	41
Octane, 2,5,6-trimethyl-	SC-QE03-SD-101	16	11/02/94	1	1.2	13
Octane, 2,6-dimethyl-	SC-QW05-SD-301	7	04/13/95	1	1.2	16
Octane, 3,3-dimethyl-	SC-QE08-SD-301	9200	04/12/95	1	2.3	57
Octane, 3,6-dimethyl-	SC-QE09-SD-302	67	04/11/95	1	1.3	23
Octane, 3-ethyl-	SC-QE02-SD-301	790	04/13/95	1	1.7	42
Octane, 6-ethyl-2-methyl-	SC-QE01-SD-301	89	04/13/95	1	1.1	12
Oxygenated Hydrocarbon	SC-QW03-SD-101	330	11/03/94			23
Pentadecane	SC-QE11-SD-303	14	04/11/95	1	1.2	16

TABLE B-18
MAXIMUM DETECTED CONCENTRATIONS AND ASSOCIATED SAMPLE LOCATIONS
FOR TENTATIVELY IDENTIFIED COMPOUNDS IN SEDIMENT SAMPLES

Compound Name	Client Description	Maximum Result	Date Collected	Foot-notes	Detection Limit	% Water
Pentane, 2,2,3,4-tetramethyl-	SC-QE02-SD-401	19	07/12/95	1	1.2	20
Pentane, 2,3,3-trimethyl-	SC-QE09-SD-303	50	04/11/95	1	1.2	19
Phenol, 2,5-bis(1-methylethyl)-	SC-QW04-SD-102	10	11/03/94	1	1.4	26
Phenol, 2,6-bis(1,1-dimethylethyl)-4-^methyl-	SC-QE11-SD-303	7.9	04/11/95	1	1.2	16
Propanal, 2-propenylhydrazone	SC-QE06-SD-403	8.8	07/12/95	1	1.2	18
Pulegone	SC-QE08-SD-301	22000	04/12/95	1	2.3	57
s-Triazolo[4,3-a]pyrazine, 3-amino-5,8- dimethyl-	SC-QE03-SD-101	8.3	11/02/94	1	1.2	13
Saturated Hydrocarbon: <C10	SC-QW03-SD-101	470	11/03/94			23
Saturated Hydrocarbon: C10-C20	SC-QE08-SD-302	1300	04/12/95			23
Siloxane	SC-QE08-SD-202	6700	01/18/95			22
Tetradecane	SC-QE08-SD-302	1900	04/12/95	1	1.3	23
Tetradecane, 2-methyl-	SC-QE10-SD-402	20	07/11/95	1	1.2	18
Tricyclo[2.2.1.02,6]heptane, 1,7,7-^trimethyl-	SC-QW02-SD-301	38	04/14/95	1	2.0	49
Tricyclo[3.3.1.13,7]decane, 1-nitro-	SC-QW02-SD-303	44	04/14/95	1	1.4	26
Tridecane	SC-QE08-SD-302	1900	04/12/95	1	1.3	23
Tridecane, 4,8-dimethyl-	SC-QE08-SD-401	220	07/11/95	1	1.9	47
Tridecane, 4-methyl-	SC-QE09-SD-301	260	04/11/95	1	1.5	34
Tridecane, 5-methyl-	SC-QE09-SD-403	590	07/11/95	1	1.2	18
Tridecane, 7-methyl-	SC-QE08-SD-402	360	07/11/95	1	1.5	33
Tridecane, 7-propyl-	SC-QE02-SD-302	110	04/13/95	1	1.4	26
Undecane	SC-QW04-SD-303	4000	04/13/95	1	1.3	21
Undecane, 2,7-dimethyl-	SC-QE06-SD-302	33	04/12/95	1	1.3	26
Undecane, 2,9-dimethyl-	SC-QE08-SD-101	780	11/01/94	1	2.5	61
Undecane, 2-methyl-	SC-QE09-SD-403	470	07/11/95	1	1.2	18
Undecane, 3,6-dimethyl-	SC-QE08-SD-302	2400	04/12/95	2	2.6	23
Undecane, 3,8-dimethyl-	SC-QE06-SD-301	990	04/12/95	1	1.7	41
Undecane, 3-ethyl-	SC-QE09-SD-302	110	04/11/95	1	1.3	23
Undecane, 3-methyl-	SC-QE03-SD-101	26	11/02/94	1	1.2	13
Undecane, 4,6-dimethyl-	SC-QE08-SD-402	1200	07/11/95	1	1.5	33
Undecane, 4-methyl-	SC-QE08-SD-102	660	11/01/94	1	1.5	33
Unknown	SC-QE08-SD-101	770	11/01/94			61
Unknown Hydrocarbon	SC-QE06-SD-203	89	01/18/95			20
Unsaturated Hydrocarbon	SC-QE08-SD-301	20000	04/12/95			57
Semivolatile Organics (ug/kg)						
(+)-(1S,3S)-2,2-Dimethyl-4-^methylidenecyclohexane	SC-QW03-SD-202	1700	01/17/95	1	1.3	20
(+,-)- beta.-Himachalene	SC-QW02-SD-302	250	04/14/95	1	1.4	28
(+-)-15-Hexadecanolide	SC-QE05-SD-201	520	01/19/95	2	2.4	16
(13RS)-14,15-Dinorlabdane-8,13-diol	SC-QE09-SD-103	400	11/01/94	1	1.2	19
(17.alpha.H,21.beta.H)-Hopane	SC-QW04-SD-402	2100	07/10/95	1	1.4	28
(1R-(1.alpha.,2.beta.,3a.alpha.,^12c.alpha.))-Bis!	SC-QE06-SD-302	13000	04/12/95	1z	1.3	26
(E)-4-(2',6',6'-Trimethyl-1'-^cyclohexen-1'yl(-3-!	SC-TR01-SD-201	180	01/17/95	1z	1.2	15
(E)-4-(2',6',6'-Trimethyl-1'-cyclohexen-1'yl)-3-pe	SC-QE09-SD-101	1100	11/01/94	1	1.3	23
(E)-6-Ethylidene-6H-dibenzo[b,d]thiopyran 5-oxide	SC-QW03-SD-101	2100	11/03/94	1	1.3	23
(Z)-4-(2',6',6'-Trimethyl-1'-cyclohexen-1'-cyclohe	SC-QE09-SD-101	1400	11/01/94	1	1.3	23
(Z)14-Tricosenyl formate	SC-QW02-SD-101	480	11/03/94	2	3.2	37
.delta.-Selinene	SC-QW01-SD-402	210	07/10/95	1	1.2	14
.Psi.,.psi.-Carotene, 7,7',8,8',11,^11',12,12',1!	SC-QW04-SD-401	420	07/10/95	2z	2.4	17
[4aS-(4a.alpha.,4b.beta.,7.alpha.^,8.alpha.,8a.al!	SC-TR01-SD-202	510	01/17/95	1z	1.2	17
1(2H)-Naphthalenone, octahydro-^8a-methyl-,cis-	SC-QW02-SD-201	1100	01/17/95	1	1.5	32
1,1'-Biphenyl, 2,2',3',4,5-^pentachloro-	SC-QW02-SD-402	520	07/10/95	2	2.5	19
1,1'-Biphenyl, 2,2',3,3',4,4'-hexachloro-	SC-QE02-SD-101	1100	11/02/94	2	2.6	22
1,1'-Biphenyl, 2,2',3,3',4,5-Hexachloro-	SC-QE02-SD-101	740	11/02/94	2	2.6	22
1,1'-Biphenyl, 2,2',3,4,4',6-hexachloro-	SC-QE02-SD-101	2600	11/02/94	2	2.6	22
1,1'-Biphenyl, 2,2',3,4,5'-^pentachloro-	SC-QE02-SD-201	500	01/19/95	2	2.4	15
1,1'-Biphenyl, 2,2',3,4,5'-pentachloro-	SC-QE02-SD-101	790	11/02/94	2	2.6	22
1,1'-Biphenyl, 2,2',3,5',6-pentachloro-	SC-QE02-SD-101	2200	11/02/94	2	2.6	22
1,1'-Biphenyl, 2,2',4,4',5-^pentachloro-	SC-QW03-SD-301	4000	04/14/95	2	4.5	56
1,1'-Biphenyl, 2,2',4,5,5'-pentachloro-	SC-QE02-SD-101	2000	11/02/94	2	2.6	22
1,1'-Biphenyl, 2,3,4,4',5-pentachloro-	SC-QE03-SD-201	290	01/19/95	2	2.6	22
1,1'-Biphenyl, pentachloro-	SC-QE02-SD-101	2900	11/02/94	2	2.6	22
1,1'-Biphenyl, tetrachloro-	SC-QE02-SD-101	1200	11/02/94	2	2.6	22

TABLE B-18
MAXIMUM DETECTED CONCENTRATIONS AND ASSOCIATED SAMPLE LOCATIONS
FOR TENTATIVELY IDENTIFIED COMPOUNDS IN SEDIMENT SAMPLES

Compound Name	Client Description	Maximum Result	Date Collected	Foot-notes	Detection Limit	% Water
1,1'-Biphenyl,2,2',4,4',6,6'-^hexachloro-	SC-QE03-SD-301	1100	04/13/95	2	2.5	19
1,1'-Biphenyl,2,2',4,4',6-^pentachloro-	SC-QE03-SD-301	1200	04/13/95	2	2.5	19
1,1':4',1"-Terphenyl, 2,4,6-^trichloro-	SC-QE07-SD-202	4100	01/18/95	1	1.3	22
1,1':4',1"-Terphenyl, 2,4,6-trichloro-	SC-QE07-SD-101	19000	11/02/94	1	1.3	20
1,1':4',1"-Terphenyl, 2,4,6-trichloro-	SC-QE07-SD-102	19000	11/02/94	1	1.2	15
1,1-Dichloro-1-sila-2,3-benzophenalane	SC-QE07-SD-101	7500	11/02/94	1	1.3	20
1,1-Dimesityl-3-methyl-1-buten-2-ol	SC-QW03-SD-402	3000	07/10/95	1	1.1	11
1,12-Benzperylene	SC-QE07-SD-302	700	04/12/95	2	2.6	22
1,2-Benzenedicarboxylic acid, butyl decyl ester	SC-QE09-SD-102	2000	11/01/94	1	1.3	22
1,2-Benzenedicarboxylic acid, diheptyl^ester	SC-QE09-SD-101	2900	11/01/94	2	2.6	23
1,2-Benzenedicarboxylic acid,^bis(8-methylnonyl)!	SC-QW04-SD-303	1000	04/13/95	1z	1.3	21
1,2-Benzenedicarboxylic acid,^decyl hexyl ester	SC-QE06-SD-103	2000	11/02/94	1	1.2	20
1,2-Benzenedicarboxylic acid,^diisononyl ester	SC-QE09-SD-101	1400	11/01/94	1	1.3	23
1,2-Benzenedicarboxylic acid,^ditridecyl ester	SC-QE09-SD-401	2300	07/11/95	1	1.3	21
1,2-Benzoperylene	SC-QE08-SD-301	14000	04/12/95	2	4.7	57
1,2-Cyclohexanediol	SC-QE03-SD-101	410	11/02/94	2	2.3	13
1,3,2-Dioxaborinane, 2-ethyl-4-^methyl-	SC-QE06-SD-201	640	01/18/95	1	1.2	14
1,3-Cyclohexadiene, 5-(1,5-dimethyl-4-hexenyl)-2-m	SC-QE08-SD-101	2300	11/01/94	1	2.5	61
1,4-Methanonaphthalene, 1,4-^dihydro-9-phenyl-	SC-QE06-SD-403	2200	07/12/95	1	1.2	18
1,6,10-Dodecatriene, 7,11-^dimethyl-3-methylene!	SC-QW01-SD-301	240	04/14/95	2z	2.5	20
1,6-Dimethyldibenzothiophene	SC-QE08-SD-102	1300	11/01/94	2	3.0	33
1,7-Dimethyldibenzothiophene	SC-QE11-SD-101	2800	11/01/94	2	2.3	15
1,7-Nonadiene, 4,8-dimethyl-	SC-QW02-SD-401	260	07/10/95	1	1.2	16
1-Azido-1-(p-methoxyphenyl)ethane	SC-QE09-SD-301	4500	04/11/95	1	1.5	34
1-Decanol, 2-ethyl-	SC-QE06-SD-103	3500	11/02/94	1	1.2	20
1-Docosanol	SC-QW02-SD-202	1000	01/17/95	2	2.8	28
1-Dodecanamine, N,N-dimethyl-	SC-QE02-SD-401	2200	07/12/95	2	2.5	20
1-Eicosanol	SC-QW03-SD-101	3100	11/03/94	1	1.3	23
1-Eicosene	SC-QW03-SD-101	2000	11/03/94	1	1.3	23
1-Eicosyne	SC-QW02-SD-301	2000	04/14/95	2	3.9	49
1-Heneicosyl formate	SC-QW02-SD-301	3100	04/14/95	2	3.9	49
1-Heptadecanol, acetate	SC-QW02-SD-301	1800	04/14/95	2	3.9	49
1-Heptadecene	SC-QW02-SD-102	420	11/03/94	2	2.7	25
1-Heptanol, 2,4-dimethyl-, (2S,4R)-(-)-	SC-QE06-SD-103	1300	11/02/94	1	1.2	20
1-Hexadecanol	SC-QW04-SD-303	1700	04/13/95	2	2.5	21
1-Hexadecanol, 2-Methyl-	SC-QW02-SD-301	820	04/14/95	2	3.9	49
1-Hexadecanol, 3,7,11,15-^tetramethyl-	SC-QE02-SD-201	390	01/19/95	1	1.2	15
1-Hexene, 5-methyl-	SC-QW04-SD-401	190	07/10/95	1	1.2	17
1-Methylnaphthalene	SC-QE02-SD-301	1900	04/13/95	2	3.4	42
1-Naphthaldehyde, (o-nitrophenyl)^hydrazone	SC-QW04-SD-202	3200	01/16/95	1	1.5	34
1-Naphthalene, decahydro-4a-methyl-^1-methylene-!	SC-TR01-SD-201	200	01/17/95	1z	1.2	15
1-Naphthalenecarboxaldehyde, 2-hydroxy-	SC-QW04-SD-101	430	11/03/94	2	3.1	36
1-Naphthalenepropanol, .alpha.-ethenyldecahydro-5-	SC-QE05-SD-101	390	11/02/94	1	1.1	13
1-Nonadecene	SC-QW02-SD-301	850	04/14/95	1	2.0	49
1-Nonene, 4,6,8-trimethyl-	SC-QE05-SD-101	340	11/02/94	1	1.1	13
1-Octadecene	SC-QW02-SD-101	770	11/03/94	2	3.2	37
1-oxo-1,2-dihydro-2,3-diaza^phenoxathiin	SC-QW03-SD-301	21000	04/14/95	1	2.3	56
1-Pentadecene	SC-TR01-SD-203	370	01/17/95	1	1.2	18
1-Penten-3-one, 2-methyl-	SC-QW02-SD-101	260	11/03/94	2	3.2	37
1-Tetradecanamine, N,N-dimethyl-	SC-QE03-SD-201	470	01/19/95	1	1.3	22
1-Undecene, 4-methyl-	SC-QE09-SD-402	270	07/11/95	1	1.2	17
10-Methoxybenz[a]azulen-1,4-dione	SC-QE02-SD-302	3300	04/13/95	1	1.4	26
10H-Phenothiaphosphine, 7-chloro^-2-fluor-10-hydr!	SC-TR01-SD-202	780	01/17/95	1z	1.2	17
11-Methylsqualene	SC-QW03-SD-401	270	07/10/95	1	1.1	9.4
11-Tricosene	SC-QW02-SD-201	1100	01/17/95	2	2.9	32
11H-Benzo[a]fluorene	SC-QE04-SD-401	3200	07/12/95	2	2.4	16
11H-Benzo[b]fluorene	SC-QE04-SD-401	3200	07/12/95	2	2.4	16
12-epi-Teucvin	SC-QW03-SD-401	520	07/10/95	1	1.1	9.4
12-Octadecenal	SC-QW02-SD-301	2300	04/14/95	2	3.9	49
13(16),14-Labdien-8-ol	SC-QE05-SD-301	260	04/12/95	1	1.2	15
13-Octadecenal	SC-QW02-SD-201	700	01/17/95	2	2.9	32

TABLE B-18
MAXIMUM DETECTED CONCENTRATIONS AND ASSOCIATED SAMPLE LOCATIONS
FOR TENTATIVELY IDENTIFIED COMPOUNDS IN SEDIMENT SAMPLES

Compound Name	Client Description	Maximum Result	Date Collected	Foot-notes	Detection Limit	% Water
14-Octadecenal	SC-QW02-SD-202	970	01/17/95	2	2.8	28
14-Octadecenoic acid, butyl ester	SC-QW05-SD-401	300	07/10/95	2	2.4	16
17-Octadecenal	SC-QW04-SD-401	270	07/10/95	2	2.4	17
17-Pentatriacontene	SC-QW02-SD-201	1100	01/17/95	1	1.5	32
1H-3a,7-Methanoazulene, 2,3,4,7,8,8a,-hexahydro-3,	SC-QW01-SD-101	240	11/03/94	2	2.4	16
1H-3a,7-Methanoazulene, 2,3,4,7,8,8a,^-hexahydro-!	SC-QW03-SD-401	160	07/10/95	2z	2.2	9.4
1H-Cycloprop[e]azulene, 1a,2,3,4,^4a,-5,6,7b-oct!	SC-QW01-SD-402	210	07/10/95	1z	1.2	14
1H-Cycloprop[e]azulene, 1a,2,3,4,4a,5,6,7b-octahyd	SC-QE11-SD-103	280	11/01/94	1	1.2	16
1H-Indene, 5-butyl-6-hexyloctahydro-	SC-QE05-SD-101	460	11/02/94	1	1.1	13
1H-Indene, octahydro-2,2,4,4,7,7-^hexamethyl-	SC-QW04-SD-202	1200	01/16/95	2	3.0	34
1H-Naphtho[2,1-b]pyran, 4a,5,6,6a,^7,8,9,10,10a,1!	SC-QW06-SD-401	230	07/10/95	1z	1.2	20
2(1H)-Naphthalenone, 4a,5,6,7,8,8a-^hexahahydro-!	SC-QW02-SD-302	920	04/14/95	1z	1.4	28
2,2-Dimethyl-2-methylene-1-^(3'-methyl-4'-penteny!	SC-QW06-SD-301	1100	04/13/95	1z	1.2	18
2,3,6,7-Tetramethylanthracene	SC-QE01-SD-301	210	04/13/95	1	1.1	12
2,4-Pentadienenitrile	SC-QE06-SD-102	7900	11/02/94	2	2.3	14
2,5-Furandione, 3-(dodecenyl)dihydro-	SC-QE06-SD-203	2500	01/18/95	2	2.5	20
2,6-Dipropyl-4-methylpyridine	SC-QE11-SD-301	1100	04/11/95	1	1.4	28
2,8-Dimethyldibenzo(B,D)thiophene	SC-QE11-SD-102	1700	11/01/94	1	1.2	17
2-(2'-Nitro-2'-propenyl)naphthalene	SC-QW03-SD-202	25000	01/17/95	1	1.3	20
2-Butanone, 4-(2,6,6-trimethyl-2-cyclohexen-1-yl)-	SC-QE03-SD-101	470	11/02/94	1	1.2	13
2-Butenal, 3-methyl-	SC-QW05-SD-101	430	11/03/94	2	2.2	10
2-Chloro-4,6-di(4-chlorophenyl)^pyrimidine	SC-QE07-SD-302	1600	04/12/95	1	1.3	22
2-Cyclohexen-1-ol, 2-methyl-5-(1-^methylethenyl)-!	SC-QW02-SD-201	690	01/17/95	1z	1.5	32
2-Cyclohexen-1-ol, 4-(3,4-dimethoxyphenyl)-4-[2-(m	SC-QW04-SD-103	270	11/03/94	1	1.2	18
2-Cyclohexene-1-carboxaldehyde,^2,6-dimethyl-6-!	SC-QW02-SD-302	500	04/14/95	1z	1.4	28
2-Docosene	SC-QW02-SD-202	1500	01/17/95	2	2.8	28
2-Dodecen-1-yl(-)succinic anhydride	SC-QW02-SD-301	850	04/14/95	2	3.9	49
2-Hexen-1-ol, 2-ethyl-	SC-QE04-SD-101	170	11/02/94	1	1.2	16
2-Hexenal diethyl acetal, trans-	SC-QE01-SD-301	490	04/13/95	1	1.1	12
2-Methyl-2,3,4,5,6,7-hexhydro-^1H-2-benzazonine	SC-QE11-SD-402	420	07/11/95	1	1.1	11
2-Methylenehydrazono-3-methyl-^2,3-dihydrobenzothi	SC-QW04-SD-101	2200	11/03/94	1	1.6	36
2-Naphthalenol, 1,6-dibromo-	SC-QE07-SD-202	1700	01/18/95	2	2.6	22
2-Nonylphenol	SC-QE09-SD-203	800	01/18/95	2	2.3	15
2-Phenanthrenol, 4b,5,6,7,8,8a,9,10-octahydro-4b,8	SC-QE08-SD-101	2800	11/01/94	2	5.1	61
2-Phenyl-2-(phenylcarbamoyl)^indan-1,3-dione	SC-QW02-SD-302	230	04/14/95	1	1.4	28
2-Phenyl-6,7-dimethylquinoxaline	SC-QE06-SD-102	1700	11/02/94	1	1.2	14
2-Phenylnaphthalene	SC-QE02-SD-302	2200	04/13/95	2	2.7	26
2-Propanone, 1-(4-methoxyphenyl)-	SC-QE10-SD-301	170	04/11/95	1	1.2	20
2-Propen-1-one, 1-(2-hydroxyphenyl)-3-^(4-hydrox!	SC-QE06-SD-301	5400	04/12/95	2z	3.4	41
2-Propenoic acid, 3-[2,3-dihydro-^3-[(4-methoxyph!	SC-QE01-SD-201	1600	01/19/95	2z	2.4	17
2-Thiazolemethanol, .alpha.-phenyl-	SC-QE08-SD-102	3800	11/01/94	1	1.5	33
24.XI.-Ethylchloest-5-en-3.beta.-ol	SC-QE11-SD-402	300	07/11/95	2	2.2	11
28-Nor-17.alpha.(H)-hopane	SC-QE08-SD-402	14000	07/11/95	1	1.5	33
28-Nor-17.beta.(H)-hopane	SC-QW03-SD-202	45000	01/17/95	1	1.3	20
2H-1,2,3-Triazole-4-carboxaldehyde, 2-(2-fluorophe	SC-QW04-SD-102	2000	11/03/94			26
2H-pyran-2-carboxylic acid, 3,6-dihydro-6-propoxy-	SC-QE06-SD-103	11000	11/02/94	2	2.5	20
3,3-Dimethyl-2-isopropyl-cyclopentane	SC-QW06-SD-401	1300	07/10/95	2	2.5	20
3,4-Dihydrocyclopenta(cd)pyrene^(acepyrene)	SC-QE04-SD-401	2300	07/12/95	2	2.4	16
3,5-Dihydroxytoluene	SC-QW06-SD-401	220	07/10/95	2	2.5	20
3,5-Dimethyl-4-hydroxybenzaldehyde	SC-QE01-SD-101	1000	11/02/94	1	1.2	15
3-Fluoranthenamine	SC-QE06-SD-102	2300	11/02/94	1	1.2	14
3-Hexadecene, (z)-	SC-QE06-SD-203	1400	01/18/95	2	2.5	20
3-Octadecene, (E)-	SC-QW02-SD-301	1200	04/14/95	2	3.9	49
3-Penten-2-one, 4-methyl-	SC-QE10-SD-301	260	04/11/95	2	2.5	20
3-Piperidinone, 1-methyl-	SC-QE05-SD-101	410	11/02/94	1	1.1	13
3-Pyridinecarbonitrile	SC-QE03-SD-201	310	01/19/95	1	1.3	22
4.(2',6',6'-Trimethylcyclohex-1'yl)^butan-1-ol	SC-QE07-SD-301	660	04/12/95	1	1.3	23
4,7-Methano-1H-indene, octahydro-	SC-QW05-SD-201	190	01/16/95	2	2.4	17
4-Hexenoic acid, 3-methyl-2,6-dioxo-	SC-QE07-SD-202	1800	01/18/95	1	1.3	22
4-Hexenoic acid, 3-methyl-2,6-dioxo-	SC-QE07-SD-202	1800	01/18/95	2	2.6	22
4-Methylnaphtho[2,1-b]thiophene	SC-QW03-SD-101	2300	11/03/94	2	2.6	23

TABLE B-18
MAXIMUM DETECTED CONCENTRATIONS AND ASSOCIATED SAMPLE LOCATIONS
FOR TENTATIVELY IDENTIFIED COMPOUNDS IN SEDIMENT SAMPLES

Compound Name	Client Description	Maximum Result	Date Collected	Foot-notes	Detection Limit	% Water
4-Octene, 2,3,6-trimethyl-	SC-QE04-SD-301	180	04/13/95	1	1.2	19
4H-Cyclopenta[def]phenanthrene	SC-QE06-SD-102	5200	11/02/94	2	2.3	14
4H-Naphtho[2,3,b]pyran-4,6,9-^trione, 5,8-dimetho!	SC-QE07-SD-302	1100	04/12/95	1z	1.3	22
5,12-Naphthacenedione	SC-QW02-SD-402	450	07/10/95	1	1.2	19
5-Bromovaleronitrile	SC-QE06-SD-302	3600	04/12/95	1	1.3	26
5-Hexenoic acid, 5-methyl-	SC-QE05-SD-201	390	01/19/95	1	1.2	16
5-Nonanone, 2,2,8,8-tetramethyl-	SC-QE06-SD-201	520	01/18/95	2	2.3	14
5.alpha.-Ergostan-15-one	SC-QE09-SD-101	2700	11/01/94	1	1.3	23
5.alpha.-Stigmast-3-one-	SC-QE06-SD-301	6100	04/12/95	1	1.7	41
6(2H)-Benzofuranone, 2-(1,3-^benzodioxol-5-yl)-3,!	SC-QW04-SD-202	7600	01/16/95	1z	1.5	34
6-Hydroxymethyl-1,4,4-trimethyl-^bicyclo(3.1.0.)!	SC-QE04-SD-301	170	04/13/95	2z	2.5	19
6-Methyl-6-(5'methyl-2'-furyl)^hepta-2,3-dione	SC-QW03-SD-202	230	01/17/95	1	1.3	20
6-Methylchrysene	SC-QE06-SD-301	6100	04/12/95	2	3.4	41
6H,8H-Benzo[10,11]chryseno[1,12-cd]^pyran-6,8-dio!	SC-QE08-SD-301	11000	04/12/95	2z	4.7	57
6H-Dibenz[b,f]oxireno[d]azepine-^6-carboxamide,1!	SC-QE09-SD-202	490	01/18/95	1z	1.2	15
7,11-Dimethyl-3-Methylen-1,6,10-dodecatriene	SC-QW01-SD-101	220	11/03/94	2	2.4	16
7-amino-3-methylpyrimido(4,5-c)pyridazin-5-(6H)-on	SC-QE11-SD-103	240	11/01/94	1	1.2	16
7H-Benz[de]anthracen-7-one	SC-QE06-SD-102	4300	11/02/94	2	2.3	14
7H-Benzo[c]fluorene	SC-QW04-SD-301	1000	04/13/95	1	1.6	39
8,11-Eicosadienoic acid, methyl ester	SC-QE05-SD-101	750	11/02/94	1	1.1	13
8-Heptadecanol, 8-methyl-	SC-QE06-SD-201	930	01/18/95	2	2.3	14
9,10-Anthracenedione	SC-QE06-SD-102	4300	11/02/94	2	2.3	14
9-Hexadecenoic acid	SC-QE09-SD-202	260	01/18/95	2	2.4	15
9-Octadecenamide, N,N-dimethyl-	SC-QE03-SD-201	2100	01/19/95	2	2.6	22
9-Octadecenoic acid (Z)-, methyl^ester	SC-QW01-SD-202	290	01/17/95	1	1.3	21
9-Tricosene, (z)-	SC-QE08-SD-201	4900	01/18/95	1	1.9	48
a'-Neogammacer-22(29)-en-3-ol,^(3.beta.,21.beta.)-	SC-QW01-SD-402	500	07/10/95	2	2.3	14
Acenaphthylidene, 1,1'-bis-	SC-QE07-SD-102	9300	11/02/94	1	1.2	15
Acetamide	SC-QW01-SD-402	180	07/10/95	2	2.3	14
Acetamide, N,N-diethyl-	SC-QW02-SD-301	620	04/14/95	2	3.9	49
Acetic acid, octadecyl ester	SC-QW02-SD-401	340	07/10/95	1	1.2	16
Acridine	SC-QE04-SD-401	1900	07/12/95	2	2.4	16
Alcohol	SC-TR01-SD-302	210	04/11/95			18
Alnulin	SC-QW02-SD-302	320	04/14/95	1	1.4	28
Amide	SC-QE08-SD-102	1400	11/01/94			33
Androsta-1,4-dien-3-one, 17-hydroxy-^17-methyl-,!	SC-QE09-SD-202	170	01/18/95	1z	1.2	15
Anthracene, 2-methyl-	SC-QE06-SD-102	1600	11/02/94	2	2.3	14
Anthracene, 9-dodecyltetradecahydro-	SC-QE02-SD-301	13000	04/13/95	1	1.7	42
Anthracene, 9-methyl-	SC-QW04-SD-101	690	11/03/94	2	3.1	36
Aristolone	SC-QE06-SD-401	9100	07/12/95	1	3.3	70
Aromatic Hydrocarbon	SC-QE08-SD-301	11000	04/12/95			57
Ascaridole	SC-QE05-SD-101	510	11/02/94	1	1.1	13
Baccharane	SC-QE09-SD-102	1200	11/01/94	1	1.3	22
Benz(a)anthracene,-7,12-dione	SC-QW02-SD-401	460	07/10/95	1	1.2	16
Benz[a]anthracene, 1-methyl-	SC-QE09-SD-203	290	01/18/95	1	1.2	15
Benz[a]anthracene, 3-methyl-	SC-QE04-SD-401	3000	07/12/95	2	2.4	16
Benz[a]anthracene, 4-methyl-	SC-QE06-SD-101	370	11/02/94	1	1.3	21
Benz[a]anthracene, 7-methyl-	SC-QE06-SD-102	2600	11/02/94	2	2.3	14
Benz[a]anthracene, 8-methyl-	SC-QW05-SD-301	220	04/13/95	2	2.4	16
Benz[j]aceanthrylene, 3-methyl-	SC-QE04-SD-401	4300	07/12/95	1	1.2	16
Benzaldehyde, 4-methyl-, oxime	SC-QE09-SD-303	350	04/11/95	1	1.2	19
Benzaldehyde, ethyl-	SC-QW03-SD-101	2700	11/03/94	1	1.3	23
Benzene, (2-bromoethenyl)-	SC-QE03-SD-101	850	11/02/94	2	2.3	13
Benzene, (pentachloroethoxy)-	SC-QE08-SD-202	2400	01/18/95	2	2.6	22
Benzene, [(1,1-dimethylethoxy)methyl]-	SC-QE01-SD-101	7800	11/02/94	2	2.4	15
Benzene, 1,2,4,5-tetramethyl-	SC-QW04-SD-303	590	04/13/95	1	1.3	21
Benzene, 1-methoxy-4-octyl-	SC-QE09-SD-203	490	01/18/95	1	1.2	15
Benzene, 1-methyl-2-(2-propenyl)-	SC-QE07-SD-103	530	11/02/94	2	2.3	14
Benzene, 2,4-difluoro-1-isocyanato-	SC-QE01-SD-301	490	04/13/95	1	1.1	12
Benzenebutanamine	SC-QE06-SD-101	1300	11/02/94	1	1.3	21
Benzenesulfonamide, 2-methyl-	SC-QE10-SD-401	650	07/11/95	1	1.2	18

TABLE B-18
MAXIMUM DETECTED CONCENTRATIONS AND ASSOCIATED SAMPLE LOCATIONS
FOR TENTATIVELY IDENTIFIED COMPOUNDS IN SEDIMENT SAMPLES

Compound Name	Client Description	Maximum Result	Date Collected	Foot-notes	Detection Limit	% Water
Benzenesulfonamide, 4-methyl-	SC-QE06-SD-302	4600	04/12/95	2	2.7	26
Benzo(a)acridine	SC-QW05-SD-301	190	04/13/95	2	2.4	16
Benzo(a)carbazole	SC-QE06-SD-103	1100	11/02/94	1	1.2	20
Benzo(e)pyrene	SC-QE04-SD-401	9200	07/12/95	2	2.4	16
Benzo[b]naphtho[1,2-d]thiophene	SC-QE06-SD-102	5900	11/02/94	2	2.3	14
Benzo[b]naphtho[2,3-d]furan	SC-QE03-SD-301	850	04/13/95	2	2.5	19
Benzo[b]naptho[2,1-d]thiophene	SC-QE02-SD-301	3400	04/13/95	2	3.4	42
Benzo[c]phenanthrene	SC-QE06-SD-102	9000	11/02/94	2	2.3	14
Benzo[c]phenanthrene, 5-methyl-	SC-QW04-SD-302	370	04/13/95	2	2.5	20
Benzo[ghi]fluoranthene	SC-QE06-SD-102	9800	11/02/94	2	2.3	14
Benzo[j]fluoranthene	SC-QE06-SD-102	12000	11/02/94	2	2.3	14
Benzo[j]fluoranthene	SC-QE08-SD-301	12000	04/12/95	2	4.7	57
Benzoic acid, 4-(bromomethyl)-	SC-TR01-SD-202	370	01/17/95	1	1.2	17
Benzoyl chloride, 3-fluoro-	SC-QW04-SD-101	420	11/03/94	1	1.6	36
Bicyclo[3.1.1]hept-2-ene, 2,6-^dimethyl-6-(4-methy	SC-QW04-SD-101	660	11/03/94	2	3.1	36
Butanoic acid, 2-butoxy-1-methyl-^2-oxoethyl ester	SC-QW04-SD-103	1100	11/03/94	2	2.4	18
Butanoic acid, 2-methyl-	SC-QW02-SD-301	400	04/14/95	2	3.9	49
Carbazole	SC-QE04-SD-401	6400	07/12/95	3	3.6	16
Cedrol	SC-QE08-SD-101	6500	11/01/94	2	5.1	61
Chlorinated Compound	SC-QE07-SD-301	2600	04/12/95			23
Chlorinated Hydrocarbon	SC-QE08-SD-402	14000	07/11/95			33
Cholest-4-en-3-ol, (3.alpha.)-	SC-QE09-SD-403	1700	07/11/95	1	1.2	18
Cholest-7-ene-3,6-dione, (5.alpha.)-	SC-QW04-SD-102	870	11/03/94	1	1.4	26
Cholestan-3-one, 4,4-dimethyl-, (5.alpha.)-	SC-QW02-SD-202	1400	01/17/95	1	1.4	28
Cholestan-4-one	SC-QE09-SD-401	1000	07/11/95	1	1.3	21
Cholestane	SC-QE08-SD-201	2600	01/18/95	1	1.9	48
Cholestane, (5.alpha.,14.beta.)-	SC-QE06-SD-202	330	01/18/95	1	1.1	12
Cholestanol	SC-QE09-SD-401	2500	07/11/95	1	1.3	21
Cholesterol	SC-QE06-SD-301	12000	04/12/95	2	3.4	41
Chromone, 3,5-dibromo-6-hydroxy-2-^methyl-	SC-TR01-SD-202	1900	01/17/95	1	1.2	17
Chromone, 3,5-dibromo-6-hydroxy-2-methyl-	SC-QE08-SD-102	4000	11/01/94	1	1.5	33
Chrysene, 5-methyl-	SC-QE05-SD-301	190	04/12/95	2	2.4	15
Coronene	SC-QE07-SD-201	1400	01/18/95	1	1.6	36
Cyclic Hydrocarbon	SC-QW03-SD-201	19000	01/17/95			61
Cyclobutanone, 2-(2,6-dimethylheptyl)-	SC-QE03-SD-101	1300	11/02/94	1	1.2	13
Cyclododecanemethanol	SC-QW02-SD-301	390	04/14/95	2	3.9	49
Cycloheptadecanol	SC-QW02-SD-102	430	11/03/94	2	2.7	25
Cycloheptanol, 3-(3,3-dimethylbutyl)-	SC-QE01-SD-101	2100	11/02/94	1	1.2	15
Cyclohexadecane	SC-QW06-SD-101	1100	11/03/94	2	2.6	24
Cyclohexane, (1,2-dimethylpropyl)-	SC-QE03-SD-101	630	11/02/94	1	1.2	13
Cyclohexane, 1,1'-methylenebis-	SC-QE02-SD-301	3400	04/13/95	1	1.7	42
Cyclohexane, 1,2-diethyl-3-methyl-	SC-QE02-SD-201	420	01/19/95	2	2.4	15
Cyclohexane, 1,4-didecyl-	SC-QW02-SD-202	1500	01/17/95	1	1.4	28
Cyclohexane, 1-(1,5-dimethylhexyl)-^4-(4-methylpe!	SC-QE08-SD-201	3100	01/18/95	2z	3.8	48
Cyclohexane, 1-(1,5-dimethylhexyl)-4-(4-methylpent	SC-QE02-SD-101	1300	11/02/94	1	1.3	22
Cyclohexane, 1-methyl-4-(1-^methylbutyl)-	SC-QE09-SD-403	1500	07/11/95	1	1.2	18
Cyclohexane, 1-propenyl-	SC-QE08-SD-302	5900	04/12/95	2	2.6	23
Cyclohexane, butyl-	SC-QW04-SD-303	970	04/13/95	2	2.5	21
Cyclohexane, decyl-	SC-QW03-SD-101	2000	11/03/94	1	1.3	23
Cyclohexane, methyl-	SC-QW03-SD-202	170	01/17/95	2	2.5	20
Cyclohexane, octyl-	SC-TR01-SD-203	230	01/17/95	2	2.4	18
Cyclohexane, pentyl-	SC-QE02-SD-301	3000	04/13/95	2	3.4	42
Cyclohexanol, dodecyl-	SC-QE07-SD-201	930	01/18/95	1	1.6	36
Cyclohexene, 5-methyl-3(1-^methylethenyl)-, tran!	SC-QW02-SD-401	920	07/10/95	1z	1.2	16
Cyclooctene, 3-(2-propenyl)-	SC-QE08-SD-202	1000	01/18/95	1	1.3	22
Cyclopenta(def)phenanthrenone	SC-QE01-SD-201	380	01/19/95	1	1.2	17
Cyclopenta[cd]pyrene	SC-QE07-SD-302	910	04/12/95	2	2.6	22
Cyclopentadecane	SC-QW04-SD-202	1600	01/16/95	1	1.5	34
Cyclopentane, (2-hexyloctyl)-	SC-QW02-SD-302	1200	04/14/95	1	1.4	28
Cyclopentane, (2-methylbutyl)-	SC-QE08-SD-302	3300	04/12/95	1	1.3	23
Cyclopentane, 1,1,3-trimethyl-3-(2-methyl-2-propen	SC-QE03-SD-101	600	11/02/94	1	1.2	13

TABLE B-18
MAXIMUM DETECTED CONCENTRATIONS AND ASSOCIATED SAMPLE LOCATIONS
FOR TENTATIVELY IDENTIFIED COMPOUNDS IN SEDIMENT SAMPLES

Compound Name	Client Description	Maximum Result	Date Collected	Foot-notes	Detection Limit	% Water
Cyclopentane, ethyl-	SC-QW04-SD-202	1300	01/16/95	2	3.0	34
Cyclopentanecarboxylic acid, 2-^amino-, trans-	SC-QW03-SD-402	250	07/10/95	1	1.1	11
Cyclopropane, pentyl-	SC-QE08-SD-102	1800	11/01/94	1	1.5	33
Cyclotetracosane	SC-QW02-SD-202	1100	01/17/95	2	2.8	28
Cyclotetradecane	SC-QW06-SD-101	620	11/03/94	2	2.6	24
d-Dihomoandrostane, (5.alpha.)-	SC-QW04-SD-102	2200	11/03/94	2	2.7	26
D-Friedoolean-14-ene, 3-methoxy-, (3.beta.)-	SC-QE09-SD-103	400	11/01/94	1	1.2	19
D-Friedoolean-14-ene, 3-methoxy-,^(3.beta.)-	SC-QE11-SD-402	2100	07/11/95	2	2.2	11
d-Galactitol, 2-(acetylmethylamino)-^2-deoxy-3,4,!	SC-QE06-SD-202	290	01/18/95	2z	2.3	12
d-Homoandrostane, (5.alpha.,13.^alpha.)-	SC-QE06-SD-203	2100	01/18/95	1	1.3	20
D-Norandrostan-16-one, (5.alpha.)-	SC-TR01-SD-202	520	01/17/95	1	1.2	17
D-Ribofuranose, 5-S-methyl-5-thio-1,2,3-tris-O-(tr	SC-QW04-SD-102	930	11/03/94	1	1.4	26
D:A-Friedooleanan-3-one	SC-QE09-SD-403	6000	07/11/95	1	1.2	18
Decahydro-4,4,8,9,10-^pentamethylnaphthalene	SC-QW04-SD-202	1200	01/16/95	2	3.0	34
Decahydro-4,4,8,9,10-pentamethyl-^naphthalene	SC-QE11-SD-103	190	11/01/94	1	1.2	16
Decane 2-cyclohexyl-, 2-cyclohexyl-	SC-QE08-SD-202	1100	01/18/95	2	2.6	22
Desmosterol	SC-QW01-SD-401	190	07/10/95	2	2.2	11
Dibenz[a,c]anthracene	SC-QE04-SD-401	26000	07/12/95	2	2.4	16
Dibenzo[def,mno]chrysene	SC-QE08-SD-301	13000	04/12/95	2	4.7	57
Dibenzothiophene	SC-QW03-SD-101	3100	11/03/94	2	2.6	23
Dibenzothiophene, 3-methyl-	SC-QE09-SD-403	2700	07/11/95	2	2.4	18
Diethylphosphinothioic azide	SC-QE09-SD-302	1100	04/11/95	2	2.6	23
Dodecane, 1,12-dibromo-	SC-QE06-SD-203	1600	01/18/95	1	1.3	20
Dodecane, 1,2-dibromo-	SC-QE08-SD-201	3500	01/18/95	1	1.9	48
Eicosane	SC-QE09-SD-303	180	04/11/95	2	2.5	19
Ent-10S-15,16-epoxy-19-norcleroda-^4,13(16), 14-!	SC-QW03-SD-401	820	07/10/95	1z	1.1	9.4
Epifriedelinol	SC-QE09-SD-402	430	07/11/95	2	2.4	17
Ergost-5-en-3-ol, (3.beta.)-	SC-QW02-SD-401	1100	07/10/95	2	2.4	16
Ergost-7-en-3-ol, (3.,beta.)-	SC-QW02-SD-301	560	04/14/95	1	2.0	49
Ergosta-14,22-dien-3-ol, (3.beta.,^5.alpha.,22E)-	SC-QW05-SD-401	250	07/10/95	2	2.4	16
Ergosta-5,22-dien-3-ol,^(3.beta.,22E,24S)-	SC-QW02-SD-301	780	04/14/95	1	2.0	49
Ergostanol	SC-QW02-SD-202	1000	01/17/95	1	1.4	28
Ethanamine, 1-(2,4-cyclopentadien-^1-ylidene)-N,N!	SC-QE09-SD-303	430	04/11/95	1z	1.2	19
Ethanethioic acid, S,S'-[thiobis^(methylene)] est!	SC-QE11-SD-301	1100	04/11/95	1z	1.4	28
Ethanoic acid, S-methyl ester	SC-QE11-SD-302	740	04/11/95	2	2.5	18
Ethanol, 2-(diethylamino)-	SC-QW04-SD-201	1000	01/16/95	2	3.1	35
Ethanol, 2-(tetradecyloxy)-	SC-QW02-SD-301	2100	04/14/95	2	3.9	49
Ethanol, 2-butoxy-, phosphate (3:1)	SC-QW04-SD-103	420	11/03/94	2	2.4	18
Ethanone, 1-(4-ethoxyphenyl)-	SC-QE09-SD-302	2000	04/11/95	1	1.3	23
Ethynyl (1R*,2R*,5S*)-5,8,8-trimethylbicyclo[3.3.0	SC-QE09-SD-101	930	11/01/94	1	1.3	23
Ethynyl (1R,2R,5S)-5,8,8-^trimethylbicyclo[3.3.0!	SC-QW01-SD-401	300	07/10/95	1z	1.1	11
Fumariline	SC-QW05-SD-401	240	07/10/95	1	1.2	16
Furan, 2,3-dihydro-4-(1-methylethyl)-	SC-QE08-SD-201	2700	01/18/95	1	1.9	48
Furan, tetrahydro-2-isopentyl-5-propyl-	SC-QE03-SD-101	1100	11/02/94	1	1.2	13
Glycerin	SC-QE11-SD-303	390	04/11/95	1	1.2	16
Heneicosane, 11-(1-ethylpropyl)-	SC-QE09-SD-202	170	01/18/95	2	2.4	15
Heptadecane, 2,6-dimethyl-	SC-QE09-SD-201	230	01/18/95	1	1.2	14
Heptanoic acid, 3-nitrophenyl ester	SC-QE01-SD-101	2700	11/02/94	2	2.4	15
Heptanoic acid, anhydride	SC-QE06-SD-201	5100	01/18/95	2	2.3	14
Hexacosanolide	SC-QW02-SD-401	290	07/10/95	1	1.2	16
Hexadecane, 1-(ethenyloxy)-	SC-QW02-SD-301	530	04/14/95	2	3.9	49
Hexadecane-1,2-diol	SC-QE08-SD-201	2700	01/18/95	2	3.8	48
Hexadecanoic acid	SC-QE03-SD-101	570	11/02/94	1	1.2	13
Hexadecanoic acid, 1-(hydroxymethyl)-^1,2-ethaned!	SC-QE06-SD-201	3000	01/18/95	1z	1.2	14
Hexadecanoic acid, 2-oxo-, methyl^ester	SC-QE08-SD-202	1900	01/18/95	2	2.6	22
Hexadecanoic acid, 2-oxy-, methyl ester	SC-QE04-SD-101	210	11/02/94	1	1.2	16
Hexadecanoic acid, butyl ester	SC-QW06-SD-401	290	07/10/95	2	2.5	20
Hexane, 1-isocyano-	SC-QE06-SD-201	510	01/18/95			14
Hexanedioic acid, bis(2-ethylhexyl)^ester	SC-QW04-SD-401	1100	07/10/95	2	2.4	17
Hexanedioic acid, dioctyl ester	SC-QE08-SD-102	1700	11/01/94	1	1.5	33
Hexanedioic acid, mono(2-^ethylhexyl)ester	SC-QE06-SD-103	1300	11/02/94	2	2.5	20

TABLE B-18
MAXIMUM DETECTED CONCENTRATIONS AND ASSOCIATED SAMPLE LOCATIONS FOR TENTATIVELY IDENTIFIED COMPOUNDS IN SEDIMENT SAMPLES

Compound Name	Client Description	Maximum Result	Date Collected	Foot-notes	Detection Limit	% Water
Hexanoic acid, 2-ethyl-	SC-QW01-SD-301	64	04/14/95	2	2.5	20
Hexanoic acid, 6-(diethoxyphosphinyl)-,^ethyl eth!	SC-QE09-SD-201	230	01/18/95	1z	1.2	14
Hop-22(29)-en-3.beta.-ol	SC-QW01-SD-401	350	07/10/95	1	1.1	11
Hydroxylamine, o-decyl-	SC-QE01-SD-101	1100	11/02/94	1	1.2	15
Indeno[2',1':4,5]thieno[3,2-b]thiopyran	SC-QE06-SD-102	2900	11/02/94	1	1.2	14
Iso-.alpha.-cedren-15-al	SC-QE09-SD-101	1500	11/01/94			23
Isocopalol .beta.-epoxide	SC-QW03-SD-301	25000	04/14/95	1	2.3	56
Isolongifolene	SC-QE08-SD-101	3200	11/01/94	2	5.1	61
Methyl trans-2-(3',4'-dimethoxy^phenyl)cyclohex-!	SC-QW02-SD-401	430	07/10/95	1z	1.2	16
N,N,N'N'-Tetramethyl[3.3]^paracyclophan-5,8-diami!	SC-QW05-SD-201	270	01/16/95	1z	1.2	17
N,N,N'N'-Tetramethyl[3.3]paracyclophan-^5,8-diam!	SC-QW06-SD-401	230	07/10/95	2z	2.5	20
N,N-Dimethyl-5-benzyloxypentylamine	SC-QW05-SD-201	240	01/16/95	1	1.2	17
N,N-Dimethyloctylamine	SC-QE02-SD-201	780	01/19/95	1	1.2	15
n-Octacosane	SC-QE07-SD-202	1900	01/18/95	1	1.3	22
n-Pentadecylcyclohexane	SC-QW04-SD-302	360	04/13/95	2	2.5	20
Naphthalene, 1,2,3,4,4a,5,6,8a-^octahydro-4a,8-di!	SC-QW01-SD-401	250	07/10/95	2z	2.2	11
Naphthalene, 1,2,3,4,4a,5,6,8a-octahydro-7-methyl-	SC-QW01-SD-101	190	11/03/94	2	2.4	16
Naphthalene, 1,2,3,4-tetrachloro-	SC-QE08-SD-102	4100	11/01/94	2	3.0	33
Naphthalene, 1,2,3,4-tetrahydro-^1-phenyl	SC-QE07-SD-302	360	04/12/95	1	1.3	22
Naphthalene, 1,2,3,5,6,7,8,8a-^octahydro-1,8a-di!	SC-QW04-SD-401	3000	07/10/95	2z	2.4	17
Naphthalene, 1,2,3,5,6,7,8,8a-octahydro-^1,8a-di!	SC-QW02-SD-302	1400	04/14/95	1z	1.4	28
Naphthalene, 1,2-dichloro-	SC-QE08-SD-102	1800	11/01/94	2	3.0	33
Naphthalene, 1,2-dimethyl-	SC-QE10-SD-401	930	07/11/95	2	2.4	18
Naphthalene, 1,3,5,7-tetrachloro-	SC-QE08-SD-102	1900	11/01/94	2	3.0	33
Naphthalene, 1,3,7-trichloro-	SC-QE09-SD-403	12000	07/11/95	2	2.4	18
Naphthalene, 1,3-dimethyl-	SC-QE08-SD-102	1200	11/01/94	2	3.0	33
Naphthalene, 1,4,6,7-tetrachloro-	SC-QE11-SD-102	7100	11/01/94	2	2.4	17
Naphthalene, 1,4,6-trimethyl-	SC-QE09-SD-403	1600	07/11/95	2	2.4	18
Naphthalene, 1,4-dichloro-	SC-QE07-SD-201	1000	01/18/95	2	3.1	36
Naphthalene, 1,5-dichloro-	SC-QE08-SD-102	1900	11/01/94	1	1.5	33
Naphthalene, 2,3,6-trichloro-	SC-QE08-SD-401	9500	07/11/95	2	3.8	47
Naphthalene, 2,3,6-trimethyl-	SC-QE09-SD-403	1500	07/11/95	2	2.4	18
Naphthalene, 2,3-dichloro-	SC-QE09-SD-401	2100	07/11/95	2	2.5	21
Naphthalene, 2,3-dimethyl-	SC-QE02-SD-301	2400	04/13/95	2	3.4	42
Naphthalene, 2,7-dichloro-	SC-QE10-SD-401	1000	07/11/95	2	2.4	18
Naphthalene, 2-(phenylmethyl)-	SC-QE02-SD-401	1900	07/12/95	1	1.2	20
Naphthalene, 2-phenyl-	SC-QE02-SD-301	2100	04/13/95	2	3.4	42
Naphthalene, decahydro-, trans-	SC-QE08-SD-302	4600	04/12/95	2	2.6	23
Naphthalene, decahydro-2,6-dimethyl-^3-octyl-	SC-QE09-SD-202	180	01/18/95	2	2.4	15
Naphthalene, decahydro-2-methyl-	SC-QE09-SD-403	1600	07/11/95	2	2.4	18
Naphthalene, heptachloro-	SC-QE07-SD-301	1300	04/12/95	2	2.6	23
Nitrogen compound	SC-QW03-SD-201	28000	01/17/95			61
Nonadecane, 2,3-dimethyl-	SC-QE08-SD-201	4300	01/18/95	1	1.9	48
Nonane, 1,9-dibromo-	SC-QE04-SD-101	1200	11/02/94	1	1.2	16
Nonane, 1-bromo-	SC-QE08-SD-202	900	01/18/95	1	1.3	22
Nonane, 1-iodo-	SC-QE05-SD-101	600	11/02/94	1	1.1	13
Nonane, 2-bromo-5-ethyl-	SC-QE03-SD-101	490	11/02/94	1	1.2	13
Nonane, 2-methyl-3-methylene-	SC-QE08-SD-202	920	01/18/95	2	2.6	22
Octadecanal	SC-QE08-SD-202	1500	01/18/95	1	1.3	22
Octadecanoic acid	SC-QW01-SD-201	200	01/17/95	2	2.7	27
Octadecanoic acid, 2-methylpropyl^ester	SC-QE07-SD-202	2200	01/18/95	2	2.6	22
Octadecanoic acid, 2-oxo-, methyl ester	SC-QE06-SD-101	1000	11/02/94	1	1.3	21
Octadecanoic acid, butyl ester	SC-QE01-SD-401	3500	07/12/95	2	2.3	14
Octanethioic acid, S-hexyl ester	SC-QE05-SD-101	320	11/02/94	2	2.3	13
Octanoic acid, 1-methyltridecyl ester	SC-QE01-SD-101	930	11/02/94	2	2.4	15
Olean-12-ene	SC-QE06-SD-401	7000	07/12/95	2	6.6	70
Olean-12-ene, 3-methoxy-, (3.beta.)-	SC-QW03-SD-401	370	07/10/95	1	1.1	9.4
Oleic Acid	SC-QW01-SD-201	910	01/17/95	2	2.7	27
Oleic acid, 3-(octadecyloxy)propyl ester	SC-QE04-SD-101	900	11/02/94	1	1.2	16
Oleic acid, 3-(octadecyloxy)propyl^ester	SC-QE06-SD-202	430	01/18/95	1	1.1	12
Osthole	SC-QW04-SD-401	170	07/10/95	2	2.4	17

TABLE B-18
MAXIMUM DETECTED CONCENTRATIONS AND ASSOCIATED SAMPLE LOCATIONS
FOR TENTATIVELY IDENTIFIED COMPOUNDS IN SEDIMENT SAMPLES

Compound Name	Client Description	Maximum Result	Date Collected	Foot-notes	Detection Limit	% Water
Oxirane, 2,2'-[1,4-butanediylbis(oxymethylene)]bis	SC-QE06-SD-102	1700	11/02/94	1	1.2	14
Oxirane, hexadecyl-	SC-QW02-SD-302	620	04/14/95	2	2.8	28
Oxirane, Tetradecyl-	SC-QE07-SD-102	1200	11/02/94	1	1.2	15
Oxygenated Hydrocarbon	SC-QE08-SD-402	17000	07/11/95			33
P-Terphenyl, 2,4,4",6-tetrachloro-	SC-QE07-SD-102	7500	11/02/94	1	1.2	15
P-Terphenyl, 2,5-dichloro-	SC-QE07-SD-101	10000	11/02/94	1	1.3	20
p-tert-Amyl phenoxy ethanol	SC-QE11-SD-201	180	01/17/95	1	1.3	24
Pentacene	SC-QE02-SD-401	12000	07/12/95	2	2.5	20
Pentadecanal	SC-QW02-SD-302	370	04/14/95	2	2.8	28
Pentalene, octahydro-1-(2-octyldecyl)-	SC-QE06-SD-203	3000	01/18/95	2	2.5	20
Pentalene, octahydro-1-(2-octyldecyl)-	SC-QE08-SD-201	3000	01/18/95	1	1.9	48
Pentane, 3-ethyl-2,3-dimethyl-	SC-QE04-SD-101	260	11/02/94	1	1.2	16
Pentanoic acid, 2,2-dimethyl-, ethenyl ester	SC-QE01-SD-101	4300	11/02/94	1	1.2	15
Pentanoic acid, 2,2-dimethyl-,^ethenyl ester	SC-QE06-SD-201	400	01/18/95	2	2.3	14
Pentanoic acid, 2-methyl-,anhydride	SC-QE08-SD-201	2300	01/18/95	1	1.9	48
Perylene	SC-QE04-SD-401	17000	07/12/95	2	2.4	16
Phenanthrene, 2-methyl-	SC-QE06-SD-102	2100	11/02/94	2	2.3	14
Phenanthrene, 9-dodecyltetradecahydro-	SC-QW01-SD-201	330	01/17/95	1	1.4	27
Phenanthrene, 9-methyl-	SC-QE03-SD-301	740	04/13/95	2	2.5	19
Phenanthro[4,5-bcd]thiophene	SC-QE02-SD-302	2700	04/13/95	1	1.4	26
Phenazine, 2-amino-8-methoxy-	SC-QE11-SD-103	200	11/01/94	1	1.2	16
Phenol, 2,4-bis(1-methylethyl)-	SC-QE11-SD-303	200	04/11/95	1	1.2	16
Phenol, 2-(1,1-dimethylethyl)-3-^methyl-	SC-QE09-SD-303	400	04/11/95	1	1.2	19
Phenol, 2-(1,1-dimethylethyl)-4-^methyl-	SC-QE09-SD-301	3400	04/11/95	1	1.5	34
Phenol, 2-(1,1-dimethylethyl)-5-^methyl-	SC-QE02-SD-302	2100	04/13/95	1	1.4	26
Phenol, 2-amino-	SC-QW02-SD-201	620	01/17/95	1	1.5	32
Phenol, 4-(1,1,3,3-tetramethylbutyl)-	SC-QE08-SD-402	12000	07/11/95	2	3.0	33
Phenol, 4-(2,2,3,3,-tetramethylbutyl)-	SC-QE07-SD-202	4400	01/18/95	2	2.6	22
Phenol, 4-(2,2,3,3-tetramethylbutyl)-	SC-QE08-SD-302	4300	04/12/95	2	2.6	23
Phenol, 4-4'-(1,2-diethyl-1,2-^ethanediyl)bis-	SC-QE09-SD-203	960	01/18/95	2	2.3	15
Phenol, 4-nonyl-	SC-QE09-SD-403	5700	07/11/95	1	1.2	18
Phenol, nonyl-	SC-QE09-SD-301	6000	04/11/95	2	3.0	34
Phosphine sulfide, triphenyl-	SC-QE09-SD-203	490	01/18/95	2	2.3	15
Phosphoric acid, 2-ethylhexyl diphenyl ester	SC-QW04-SD-103	1200	11/03/94	2	2.4	18
Phosphoric acid, 2-ethylhexyl^diphenyl ester	SC-QE02-SD-302	2500	04/13/95	2	2.7	26
Phosphoric acid, octyl diphenyl ester	SC-QW04-SD-102	3500	11/03/94	2	2.7	26
Phthalate	SC-QW03-SD-201	41000	01/17/95			61
Phthalic acid, didecyl ester	SC-QW03-SD-201	11000	01/17/95	2	5.1	61
Phthalic acid, diisooctyl ester	SC-QE09-SD-102	3400	11/01/94	1	1.3	22
Polycyclic Hydrocarbon	SC-QE06-SD-302	2300	04/12/95			26
Polynuclear Aromatic Hydrocarbon	SC-QW03-SD-301	27000	04/14/95			56
Prasterone	SC-QW02-SD-302	450	04/14/95	2	2.8	28
Propanoic acid	SC-QW02-SD-301	430	04/14/95	2	3.9	49
Propanoic acid, anhydride	SC-QE08-SD-202	2600	01/18/95	1	1.3	22
Propanoyl chloride, 2,2-dichloro-	SC-QE07-SD-103	1500	11/02/94	2	2.3	14
Propoxyphene	SC-QE02-SD-201	440	01/19/95	1	1.2	15
Pyrazine, 2,5-diethyl-	SC-QW01-SD-402	210	07/10/95	1	1.2	14
Pyrene, 1,3-dimethyl-	SC-QE06-SD-103	1200	11/02/94	1	1.2	20
Pyrene, 1-methyl-	SC-QE08-SD-401	10000	07/11/95	2	3.8	47
Pyrene, 2-methyl-	SC-QW05-SD-301	200	04/13/95	1	1.2	16
Pyrene, 4-methyl-	SC-QE03-SD-301	720	04/13/95	1	1.2	19
Saturated Hydrocarbon: <C10	SC-QE08-SD-302	5100	04/12/95			23
Saturated Hydrocarbon: >C20	SC-QE08-SD-402	33000	07/11/95			33
Saturated Hydrocarbon: C10-C20	SC-QE08-SD-101	1300	11/01/94			61
Saturated Hydrocarbon: C10-C20	SC-QE08-SD-402	40000	07/11/95			33
Saturated Hydrocarbon: C10-C20	SC-QE09-SD-401	1300	07/11/95			21
Saturated Hydrocarbon: C10-C20	SC-QE09-SD-403	1300	07/11/95			18
Silicic acid (H4SIO4), tetrakis(2-ethylbutyl) este	SC-QE04-SD-101	220	11/02/94	2	2.4	16
Silicic acid (H4SIO4), tetrakis^(2-ethylbutyl) es!	SC-QE06-SD-203	880	01/18/95	2z	2.5	20
Siloxane	SC-QE02-SD-401	17000	07/12/95			20
Siloxane	SC-QE03-SD-402	6700	07/12/95			13

TABLE B-18
MAXIMUM DETECTED CONCENTRATIONS AND ASSOCIATED SAMPLE LOCATIONS FOR TENTATIVELY IDENTIFIED COMPOUNDS IN SEDIMENT SAMPLES

Compound Name	Client Description	Maximum Result	Date Collected	Foot-notes	Detection Limit	% Water
Squalene	SC-QW03-SD-202	380	01/17/95	1	1.3	20
Stannane, bromodibutyl(1-methylethyl)-	SC-QE03-SD-101	1000	11/02/94	2	2.3	13
Stannane, bromotributyl-	SC-QW02-SD-201	970	01/17/95	2	2.9	32
Stannane, chlorotris(2-methylpropyl)-	SC-QW02-SD-201	2200	01/17/95	2	2.9	32
Stannane, tributylchloro-	SC-QE02-SD-301	2800	04/13/95	2	3.4	42
Sterol	SC-QE09-SD-301	1400	04/11/95			34
Stigmast-4-en-3-one	SC-QE06-SD-302	5000	04/12/95	2	2.7	26
Stigmast-5-en-3-ol-, (3.beta.,24S)-	SC-QE06-SD-401	29000	07/12/95	2	6.6	70
Stigmasta-4,22-dien-3-one	SC-QW02-SD-202	1600	01/17/95	1	1.4	28
Stigmastane	SC-QE06-SD-402	8800	07/12/95	1	1.3	23
Stigmastane	SC-QE08-SD-301	8800	04/12/95	1	2.3	57
Stigmasterol	SC-QW02-SD-202	1300	01/17/95	2	2.8	28
Sulfur	SC-QE11-SD-101	6300	11/01/94	2	2.3	15
Sulfur, mol. (S8)	SC-QE11-SD-101	7000	11/01/94	2	2.3	15
Tacamonine	SC-QE01-SD-301	410	04/13/95	1	1.1	12
Tetradecanal	SC-QW02-SD-301	740	04/14/95	2	3.9	49
Tetradecane, 1-chloro-	SC-QE07-SD-202	1800	01/18/95	1	1.3	22
Tetradecanoic acid	SC-QE05-SD-201	390	01/19/95	2	2.4	16
Tetradecanoic acid, eicosyl ester	SC-QE06-SD-102	1600	11/02/94	1	1.2	14
Thiophene, 2-heptadecyl-	SC-QE06-SD-203	2900	01/18/95	1	1.3	20
Thiourea, N-methyl-N,N'-diphenyl-	SC-QW05-SD-301	190	04/13/95	1	1.2	16
Tricyclo[4.3.0.07,9]nonane, 2,2,^5,5,8,8-hexamet!	SC-QE08-SD-401	5900	07/11/95	1z	1.9	47
Tridecanal	SC-QE08-SD-202	2000	01/18/95	2	2.6	22
Tridecane 7-cyclohexyl-, 7-cyclohexyl-	SC-QE08-SD-201	4200	01/18/95	2	3.8	48
Triphenylene	SC-QE02-SD-302	2900	04/13/95	1	1.4	26
Undecanal, 2-methyl-	SC-QE02-SD-101	590	11/02/94	2	2.6	22
Undecane, 2-methyl-	SC-QE09-SD-201	170	01/18/95	2	2.3	14
Unknown	SC-QE08-SD-402	54000	07/11/95			33
Unsaturated Hydrocarbon	SC-QE07-SD-301	740	04/12/95			23
Urs-20-en-16-oi, (16.beta.,18.^alpha.,19.alpha.)-	SC-QE06-SD-302	11000	04/12/95	1	1.3	26
Urs-20-en-16-ol, (16.beta.,18.alpha.,19.alpha.)-	SC-QW04-SD-102	940	11/03/94		2.7	26
Valerophenone, 2'-(trimethylsiloxy)-	SC-QE09-SD-202	230	01/18/95	2	2.4	15
Vitamin E	SC-QE06-SD-401	14000	07/12/95	2	6.6	70
Xylofuranose, 1,2-O-isopropylidene-^4-thio-, .alp!	SC-QE11-SD-302	180	04/11/95	1z	1.2	18
Zinc, bis[2-(1,1-dimethylethyl)-^3,3-dimethylcycl!	SC-QE08-SD-302	3800	04/12/95	2z	2.6	23

Footnotes: B = Compound also is detected in blank. J = Results below the reporting limit or is an estimated concentration.
ND = Not Detected. M = Primary Result. 1 = Tentative ID. 2 = Confident ID. z = Name longer than data field allows.

TABLE B-19
STATISTICAL EVALUATION OF TENTATIVELY IDENTIFIED COMPOUNDS IN SURFACE WATER SAMPLES

Compound Name	Frequency of Detection	Average Result	Maximum Result	Minimum Result
Volatile Organics (ug/L)				
1H-Indene, 2,3-dihydro-1,2-dimethyl-	1	5.10	5.1	5.1
2,5-Cyclohexadiene,1,4-dione,^2,6-bis(1,1-dimethy!	1	5.90	5.9	5.9
Aromatic Hydrocarbon	3	6.22	6.9	5.3
Benzene, 1,2,4,5-tetramethyl-	1	5.60	5.6	5.6
Benzene, 1,3-diethyl-5-methyl-	1	5.10	5.1	5.1
Benzene, methyl(1-methylethyl)-	2	14.45	19	9.9
Ethene, 1,2-dichloro-,(Z)	1	41.00	41	41
Saturated Hydrocarbon: C10-C20	4	7.05	11	5.5
TID Compound 11	1			
Unknown	2	8.90	16	5.2
cis-1,2-Dichloroethene	3	23.53	39	5.6
Semivolatile Organics (ug/L)				
(+-)-15-Hexadecanolide	3	5.97	6.6	5.5
(threo-2-Bromo-1-methylpropyl)cyanamide	1	82.00	82	82
1,1'-Biphenyl, 4,4'-difluoro-	2	3.90	3.9	3.9
1,2-Ethanediamine, N,N-diethyl-	3	13.40	26	4.2
1,3-Cyclopentanedione, 2-bromo-	4	12.63	28	4.6
1,3-Propanediol, 2,2-dimethyl-	2	22.50	29	16
1-Pentadecene	1	6.30	6.3	6.3
1-Propanol, 2-(2-hydroxypropoxy)-	4	10.48	19	4.7
1-Propanol, 2-(2-methoxypropoxy)-	3	5.23	5.7	5
1-Propanol, 2-methoxy-	2	4.30	4.3	4.3
1-Propene, 1,2,3-trichloro-	1	4.70	4.7	4.7
15-Crown-5	1	6.30	6.3	6.3
1H-Indol-5-ol	4	7.78	9.1	6.2
1H-Indole, 2,3-dihydro-4-methyl-	1	6.60	6.6	6.6
2(5H)-Furanone, 3-methyl-	1	6.30	6.3	6.3
2(5H)-Furanone, 5-methyl-	2	8.65	9.5	7.8
2,4-Imidazolidinedione, 1,3-^dichloro-5,5-dimethy!	1	6.60	6.6	6.6
2,4-Imidazolidinedione, 1,3-dichloro-5,5-dimethyl-	1	6.10	6.1	6.1
2,4-Imidazolidinedione, 1-(hydroxymethyl)-5,5-dime	5	23.19	62	4.8
2,4-Imidazolidinedione, 1-^(hydroxymethyl)-5,5-di!	14	41.41	100	5.4
2,4-Imidazolidinedione, 5,5-dimethyl-	9	30.32	150	4.2
2,5,8,11,14-Pentaoxahexadecan-16-ol	1	8.20	8.2	8.2
2,5-Hexanedione	1	4.80	4.8	4.8
2-Butanol, 3,3'-oxybis-	3	12.18	25	4.8
2-Butanol, 3-methyl-	1	12.00	12	12
2-Methyl-5-phenyltetrazole	1	7.40	7.4	7.4
2-Nonadecanone, o-methyloxime	1	3.90	3.9	3.9
2-Nonanone, O-methyloxime	2	12.67	16	10
2-Octanone, O-methyloxime	1	6.30	6.3	6.3
2-Pentanone, 4-hydroxy-4-methyl-	1	16.00	16	16
2-Propanol, 1,1'-[(1-methyl-1,2-^ethanediyl)bis!	1	5.40	5.4	5.4
2-Propanol, 1,1'-oxybis-	1	16.00	16	16
2-Propanol, 1-(2-methoxy-1-^methylethoxy)-	6	30.54	55	4
2-Propanol, 1-(2-methoxypropoxy)-	5	88.18	150	4
2-Propanol, 1-(diethylamino)-	1	8.20	8.2	8.2
2-Propanol, 1-[1-methyl-2-(2-^propenyloxy)ethoxy]-	2	6.58	7.9	5.1
2-Pyridinecarbonitrile	9	9.38	21	4.8
2-Pyrrolidinone, 1-methyl-	1	5.90	5.9	5.9

TABLE B-19
STATISTICAL EVALUATION OF TENTATIVELY IDENTIFIED COMPOUNDS IN SURFACE WATER SAMPLES

Compound Name	Frequency of Detection	Average Result	Maximum Result	Minimum Result
2-Tridecanone, O-methyloxime	1	14.00	14	14
2H-1-Benzopyran-2-one, 7-(diethylamino)-	3	8.57	10	7.4
2H-Indol-2-one, 1,3-dihydro-	20	15.00	52	4.3
3-Pentanol	1	5.40	5.4	5.4
3-Pyridinecarbonitrile	5	8.38	17	4.4
4-Penten-2-ol	3	9.60	16	7
4-Pyridinecarbonitrile	3	16.33	21	12
6H-Purin-6-one, 2-(dimethylamino)-^1,7-dihydro-	3	8.53	9.3	7.3
9,12,15-Octadecatrien-1-ol	1	14.00	14	14
9-Hexadecenoic acid	6	10.85	15	4.7
9-Octadecenamide, N,N-dimethyl-	1	5.10	5.1	5.1
Acetamide, N,N-diethyl-	2	5.05	5.8	4.3
Acetamide, N,N-dimethyl-	1	4.10	4.1	4.1
Alcohol	1	4.30	4.3	4.3
Amine	1	11.00	11	11
Aromatic Hydrocarbon	12	13.02	26	3.9
Benzaldehyde, 4-methyl-, oxime	1	11.00	11	11
Benzene, (1-bromoethyl)-	1	5.20	5.2	5.2
Benzene, (1-methylnonyl)-	1	5.50	5.5	5.5
Benzene, (2-bromoethenyl)-	2	5.58	6.5	4.7
Benzene, (2-methyl-1-butenyl)-	1	8.40	8.4	8.4
Benzene, (3-methyl-2-butenyl)-	1	16.00	16	16
Benzene, 1-isocyanato-2-methyl-	4	15.76	28	6.8
Benzene, 1-isocyanato-3-methyl-	3	9.93	12	7.8
Benzene, 1-isocyanato-4-methyl-	2	7.80	11	4.6
Benzene, 4-azido-1-methyl-2-^nitro-	1	5.00	5	5
Benzeneacetonitrile	1	4.60	4.6	4.6
Benzenesulfonamide, 4-methyl-	3	19.83	34	5.5
Butanamide, N-ethyl-	2	9.17	13	4.8
Butane, 1,3-dibromo-3-methyl-	1	4.50	4.5	4.5
Caffeine	2	7.70	11	4.4
Chlorinated Hydrocarbon	2	6.75	9.1	4.4
Cholestanol	1	7.50	7.5	7.5
Cyclic Hydrocarbon	2	9.35	14	4.7
Cyclohexane, (1,3-dimethylbutyl)-	1	20.00	20	20
Cyclohexane, hexyl-	1	18.00	18	18
Cyclohexane, methyl-	2	5.55	5.9	5.2
Cyclohexanol, 2-bromo-, cis-	2	4.20	4.3	4.1
Cyclohexanol, 2-bromo-, trans-	1	4.30	4.3	4.3
Cyclooctene, 5,6-diethenyl-, trans-	1	7.50	7.5	7.5
Cyclotetradecane	1	3.80	3.8	3.8
Diethyltryptamine	1	5.80	5.8	5.8
Eicosane, 7-hexyl-	1	3.90	3.9	3.9
Ethanamine, N-ethyl-	1	20.00	20	20
Ethane, 1,2-dimethoxy-	1	6.60	6.6	6.6
Ethanol, 2-(2-butoxyethoxy)-	2	4.60	5.4	3.8
Ethanol, 2-(2-butoxyethoxy)-,^acetate	1	16.00	16	16
Ethanol, 2-(2-ethoxyethoxy)-	4	7.40	11	4.6
Ethanol, 2-(2-methoxyethoxy)-	2	11.70	14	9.4
Ethanol, 2-(diethylamino)-	13	462.83	3200	6.6
Ethanol, 2-(dodecyloxy)-	1	4.70	4.7	4.7

TABLE B-19
STATISTICAL EVALUATION OF TENTATIVELY IDENTIFIED COMPOUNDS IN SURFACE WATER SAMPLES

Compound Name	Frequency of Detection	Average Result	Maximum Result	Minimum Result
Ethanol, 2-[2-[4-(1,1,3,3-tetramethylbutyl)phenoxy	2	12.00	12	12
Ethanol, 2-[4-(1,1-dimethylethyl)^phenoxy]-	3	9.41	13	6.7
Ethanol, 2-butoxy-	6	10.42	18	4
Ethanol, 2-butoxy-, phosphate (3:1)	5	15.04	26	6
Ethanol, nonylphenoxy-	3	10.43	12	8.3
Ethanone, 1-(3,3-dimethyloxiranyl)-	1	4.30	4.3	4.3
Formamide, N,N'-diethyl-	2	10.40	16	4.8
Furaltadone	1	4.10	4.1	4.1
Heptadecane, 4-methyl-	1	7.80	7.8	7.8
Hexadecane, 3-methyl-	1	7.90	7.9	7.9
Hexadecanoic acid	7	10.74	14	5.4
Hexanoic acid, 3,5,5-trimethyl-	2	11.55	16	7.1
Hexylene Glycol	1	92.00	92	92
Hydroperoxide, 1,1-dimethylethyl-	1	9.00	9	9
Imidazolidine, 1,3-diphenyl-2-propyl-	1	9.10	9.1	9.1
Methane, diethoxy-	1	4.45	4.7	4.2
Methanediaamine, N,N,N',N'-tetraethyl-	1	4.20	4.2	4.2
Morpholine, 4-ethyl-	7	11.51	24	4.9
Morpholine, 4-methyl-	1	22.00	22	22
Nitrogen compound	2	9.60	12	7.2
Nonacosanol	1	10.00	10	10
Octadecanoic acid, 12-hexyl-,^methyl ester	1	5.70	5.7	5.7
Oleic Acid	4	7.93	9.5	6.3
Oxacycloheptadecan-2-one	1	12.00	12	12
Oxacyclohexadecan-2-one	1	6.10	6.1	6.1
Oxacyclohexadecan-2-one, 16-methyl-	1	12.00	12	12
Oxygenated Hydrocarbon	20	7.21	23	3.9
Pentanamide, N-ethyl-	2	9.48	18	4.5
Pentane, 1,4-dibromo-	1	5.80	5.8	5.8
Pentane, 2,4-dibromo-	2	5.55	6.1	5
Phenol, 4-(2,2,3,3-tetramethylbutyl)-	1	4.30	4.3	4.3
Phosphine oxide, triphenyl-	11	76.82	140	23
Phosphine sulfide, triphenyl-	10	12.80	18	7
Phosphoric acid, 2-ethylhexyl^diphenyl ester	1	4.00	4	4
Polynuclear Aromatic Hydrocarbon	5	7.36	11	4.4
Propane, 1,1'-[ethylidenebis(oxy)]-^bis-	1	6.20	6.2	6.2
Propane, 1,2-dimethoxy-	1	5.90	5.9	5.9
Propanoic acid, 2-methyl-, 2,2-^dimethyl-1-(2-hyd!	2	5.25	5.4	5.1
Saturated Hydrocarbon: >C20	18	8.26	25	3.9
Saturated Hydrocarbon: C10-C20	9	17.73	76	4.4
Siloxane	1	8.40	8.4	8.4
Tetratetracontane	1	4.30	4.3	4.3
Triethylamine	1	12.00	12	12
Undecane, 2,3-dimethyl-	1	6.10	6.1	6.1
Undecane, 4,6-dimethyl-	1	8.90	8.9	8.9
Unknown	2	106.17	300	5.5

TABLE B-20
MAXIMUM DETECTED CONCENTRATIONS AND ASSOCIATED SAMPLE LOCATIONS
FOR TENTATIVELY IDENTIFIED COMPOUNDS IN SURFACE WATER

Compound Name	Result	Client Description	Date Collected	Footnotes	Detection Limit
Volatile Organics (ug/L)					
1H-Indene, 2,3-dihydro-1,2-dimethyl-	5.1	SC-QE09-SW-201	01/18/95	1	1.0
2,5-Cyclohexadiene,1,4-dione,^2,6-bis(1,1-dimethyl	5.9	SC-QW04-SW-201	01/16/95	1z	1.0
Aromatic Hydrocarbon	6.9	SC-QE10-SW-201	01/17/95		
Benzene, 1,2,4,5-tetramethyl-	5.6	SC-QE11-SW-201	01/17/95	1	1.0
Benzene, 1,3-diethyl-5-methyl-	5.1	SC-QE09-SW-201	01/18/95	1	1.0
Benzene, methyl(1-methylethyl)-	19	SC-QE09-SW-201	01/18/95	1	1.0
cis-1,2-Dichloroethene	39	SC-QW04-SW-101	11/04/94	3	3.0
Ethene, 1,2-dichloro-,(Z)	41	SC-QW04-SW-201	01/16/95	3	3.0
Saturated Hydrocarbon: C10-C20	11	SC-QE10-SW-201	01/17/95		
TID Compound 11		SC-QE09-SW-201	01/18/95		
Unknown	16	SC-QW06-SW-101	11/03/94		
Semivolatile Organics (ug/L)					
(+-)-15-Hexadecanolide	6.6	SC-QE10-SW-401	07/11/95	2	2.0
(threo-2-Bromo-1-methylpropyl)cyanamide	82	SC-QE02-SW-101	11/02/94	1	1.0
1,1'-Biphenyl, 4,4'-difluoro-	3.9	SC-QE02-SW-401	07/12/95	1	1.0
1,1'-Biphenyl, 4,4'-difluoro-	3.9	SC-QE03-SW-401	07/12/95	2	2.0
1,2-Ethanediamine, N,N-diethyl-	26	SC-QE02-SW-201	01/19/95	2	2.0
1,3-Cyclopentanedione, 2-bromo-	28	SC-QE03-SW-101	11/02/94	2	2.0
1,3-Propanediol, 2,2-dimethyl-	29	SC-QE09-SW-401	07/11/95	2	2.0
1-Pentadecene	6.3	SC-QW02-SW-301	04/14/95	1	1.0
1-Propanol, 2-(2-hydroxypropoxy)-	19	SC-QE09-SW-401	07/11/95	2	2.0
1-Propanol, 2-(2-methoxypropoxy)-	5.7	SC-QE10-SW-101	11/01/94	2	2.0
1-Propanol, 2-methoxy-	4.3	SC-QE01-SW-201	01/19/95	2	2.0
1-Propanol, 2-methoxy-	4.3	SC-QE03-SW-201	01/19/95	2	2.0
1-Propene, 1,2,3-trichloro-	4.7	SC-QW03-SW-201	01/17/95	2	2.0
15-Crown-5	6.3	SC-QE09-SW-301	04/11/95	2	2.0
1H-Indol-5-ol	9.1	SC-QE10-SW-301	04/11/95	1	1.0
1H-Indole, 2,3-dihydro-4-methyl-	6.6	SC-QE05-SW-201	01/19/95	2	2.0
2(5H)-Furanone, 3-methyl-	6.3	SC-QE01-SW-401	07/12/95	2	2.0
2(5H)-Furanone, 5-methyl-	9.5	SC-QE02-SW-401	07/12/95	2	2.0
2,4-Imidazolidinedione, 1,3-^dichloro-5,5-dimethyl	6.6	SC-QE05-SW-301	04/12/95	1z	1.0
2,4-Imidazolidinedione, 1,3-dichloro-5,5-dimethyl-	6.1	SC-QE03-SW-101	11/02/94	2	2.0
2,4-Imidazolidinedione, 1-(hydroxymethyl)-5,5-dime	62	SC-QE04-SW-101	11/02/94	1	1.0
2,4-Imidazolidinedione, 1-^(hydroxymethyl)-5,5-di!	100	SC-QE01-SW-401	07/12/95	2z	2.0
2,4-Imidazolidinedione, 1-^(hydroxymethyl)-5,5-di!	100	SC-QE02-SW-401	07/12/95	2z	2.0
2,4-Imidazolidinedione, 5,5-dimethyl-	150	SC-QE03-SW-101	11/02/94	1	1.0
2,5,8,11,14-Pentaoxahexadecan-16-ol	8.2	SC-QE09-SW-301	04/11/95	2	2.0
2,5-Hexanedione	4.8	SC-QW03-SW-201	01/17/95	2	2.0
2-Butanol, 3,3'-oxybis-	25	SC-QE09-SW-401	07/11/95	2	2.0
2-Butanol, 3-methyl-	12	SC-QE02-SW-301	04/13/95	1	1.0
2-Methyl-5-phenyltetrazole	7.4	SC-QE04-SW-101	11/02/94	1	1.0
2-Nonadecanone, o-methyloxime	3.9	SC-QE05-SW-201	01/19/95	2	2.0
2-Nonanone, O-methyloxime	16	SC-QE02-SW-201	01/19/95	2	2.0
2-Octanone, O-methyloxime	6.3	SC-QE02-SW-201	01/19/95	2	2.0
2-Pentanone, 4-hydroxy-4-methyl-	16	SC-QE05-SW-301	04/12/95	2	2.0
2-Propanol, 1,1'-[(1-methyl-1,2-^ethanediyl)bis!	5.4	SC-QE03-SW-101	11/02/94	2	2.0
2-Propanol, 1,1'-oxybis-	16	SC-QE10-SW-101	11/01/94	2	2.0
2-Propanol, 1-(2-methoxy-1-^methylethoxy)-	55	SC-QE02-SW-101	11/02/94	2	2.0
2-Propanol, 1-(2-methoxypropoxy)-	150	SC-QE08-SW-101	11/01/94	2	2.0
2-Propanol, 1-(diethylamino)-	8.2	SC-QE03-SW-201	01/19/95	2	2.0
2-Propanol, 1-[1-methyl-2-(2-^propenyloxy)ethoxy]-	7.9	SC-QE01-SW-101	11/02/94	2	2.0
2-Pyridinecarbonitrile	21	SC-QE03-SW-301	04/13/95	2	2.0
2-Pyrrolidinone, 1-methyl-	5.9	SC-QE05-SW-301	04/12/95	2	2.0
2-Tridecanone, O-methyloxime	14	SC-QE02-SW-201	01/19/95	2	2.0
2H-1-Benzopyran-2-one, 7-(diethylamino)-	10	SC-QE09-SW-301	04/11/95	2	2.0
2H-Indol-2-one, 1,3-dihydro-	52	SC-QW05-SW-101	11/03/94	2	2.0
2H-Indol-2-one, 1,3-dihydro-	52	SC-QW06-SW-101	11/03/94	2	2.0
3-Pentanol	5.4	SC-QE02-SW-301	04/13/95	1	1.0
3-Pyridinecarbonitrile	17	SC-QE02-SW-101	11/02/94	1	1.0
4-Penten-2-ol	16	SC-QE02-SW-201	01/19/95	2	2.0
4-Pyridinecarbonitrile	21	SC-QE05-SW-301	04/12/95	2	2.0

TABLE B-20
MAXIMUM DETECTED CONCENTRATIONS AND ASSOCIATED SAMPLE LOCATIONS
FOR TENTATIVELY IDENTIFIED COMPOUNDS IN SURFACE WATER

Compound Name	Result	Client Description	Date Collected	Footnotes	Detection Limit
6H-Purin-6-one, 2-(dimethylamino)-^1,7-dihydro-	9.3	SC-QE09-SW-301	04/11/95	1	1.0
9,12,15-Octadecatrien-1-ol	14	SC-QE09-SW-401	07/11/95	2	2.0
9-Hexadecenoic acid	15	SC-QE09-SW-301	04/11/95	2	2.0
9-Hexadecenoic acid	15	SC-QE10-SW-301	04/11/95	2	2.0
9-Octadecenamide, N,N-dimethyl-	5.1	SC-QE03-SW-201	01/19/95	2	2.0
Acetamide, N,N-diethyl-	5.8	SC-QW03-SW-301	04/14/95	2	2.0
Acetamide, N,N-dimethyl-	4.1	SC-QE02-SW-201	01/19/95	1	1.0
Alcohol	4.3	SC-QE07-SW-201	01/18/95		
Amine	11	SC-QE02-SW-301	04/13/95		
Aromatic Hydrocarbon	26	SC-QE10-SW-201	01/17/95		
Aromatic Hydrocarbon	6.9	SC-QE11-SW-301	04/11/95		
Benzaldehyde, 4-methyl-, oxime	11	SC-QE11-SW-201	01/17/95	1	1.0
Benzene, (1-bromoethyl)-	5.2	SC-QE10-SW-401	07/11/95	1	1.0
Benzene, (1-methylnonyl)-	5.5	SC-QE11-SW-401	07/11/95	2	2.0
Benzene, (2-bromoethenyl)-	6.5	SC-QE03-SW-201	01/19/95	2	2.0
Benzene, (2-methyl-1-butenyl)-	8.4	SC-QE11-SW-201	01/17/95	1	1.0
Benzene, (3-methyl-2-butenyl)-	16	SC-QE09-SW-201	01/18/95	1	1.0
Benzene, 1-isocyanato-2-methyl-	28	SC-QE02-SW-401	07/12/95	2	2.0
Benzene, 1-isocyanato-3-methyl-	12	SC-QE06-SW-201	01/18/95	2	2.0
Benzene, 1-isocyanato-4-methyl-	11	SC-QE02-SW-101	11/02/94	2	2.0
Benzene, 4-azido-1-methyl-2-^nitro-	5	SC-QE04-SW-301	04/13/95	1	1.0
Benzeneacetonitrile	4.6	SC-QE03-SW-101	11/02/94	1	1.0
Benzenesulfonamide, 4-methyl-	34	SC-QE02-SW-301	04/13/95	2	2.0
Butanamide, N-ethyl-	13	SC-QE03-SW-201	01/19/95		
Butane, 1,3-dibromo-3-methyl-	4.5	SC-QE02-SW-301	04/13/95	1	1.0
Caffeine	11	SC-QE02-SW-301	04/13/95	2	2.0
Chlorinated Hydrocarbon	9.1	SC-QE02-SW-401	07/12/95		
Cholestanol	7.5	SC-QE02-SW-301	04/13/95	2	2.0
Cyclic Hydrocarbon	14	SC-QE10-SW-201	01/17/95		
Cyclohexane, (1,3-dimethylbutyl)-	20	SC-QE09-SW-201	01/18/95	1	1.0
Cyclohexane, hexyl-	18	SC-QE09-SW-201	01/18/95	2	2.0
Cyclohexane, methyl-	5.9	SC-QE08-SW-101	11/01/94	2	2.0
Cyclohexanol, 2-bromo-, cis-	4.3	SC-QE07-SW-101	11/02/94	2	2.0
Cyclohexanol, 2-bromo-, trans-	4.3	SC-QE03-SW-101	11/02/94	2	2.0
Cyclooctene, 5,6-diethenyl-, trans-	7.5	SC-QW02-SW-301	04/14/95	2	2.0
Cyclotetradecane	3.8	SC-QW02-SW-301	04/14/95	2	2.0
Diethyltryptamine	5.8	SC-QE07-SW-301	04/12/95	1	1.0
Eicosane, 7-hexyl-	3.9	SC-QE03-SW-201	01/19/95	2	2.0
Ethanamine, N-ethyl-	20	SC-QW02-SW-301	04/14/95	2	2.0
Ethane, 1,2-dimethoxy-	6.6	SC-QE03-SW-401	07/12/95	2	2.0
Ethanol, 2-(2-butoxyethoxy)-	5.4	SC-QE01-SW-401	07/12/95	2	2.0
Ethanol, 2-(2-butoxyethoxy)-, ^acetate	16	SC-QE02-SW-201	01/19/95	1	1.0
Ethanol, 2-(2-ethoxyethoxy)-	11	SC-QE03-SW-201	01/19/95	2	2.0
Ethanol, 2-(2-methoxyethoxy)-	14	SC-QE06-SW-201	01/18/95	2	2.0
Ethanol, 2-(diethylamino)-	3200	SC-QW04-SW-201	01/16/95	2	2.0
Ethanol, 2-(dodecyloxy)-	4.7	SC-QE03-SW-301	04/13/95	2	2.0
Ethanol, 2-[2-[4-(1,1,3,3-tetramethylbutyl)phenoxy	12	SC-QE10-SW-101	11/01/94	1	1.0
Ethanol, 2-[2-[4-(1,1,3,3-tetramethylbutyl)phenoxy	12	SC-QE11-SW-101	11/01/94	1	1.0
Ethanol, 2-[4-(1,1-dimethylethyl)^phenoxy]-	13	SC-QE09-SW-301	04/11/95	2	2.0
Ethanol, 2-[4-(1,1-dimethylethyl)^phenoxy]-	13	SC-QE10-SW-301	04/11/95	2	2.0
Ethanol, 2-butoxy-	18	SC-QE02-SW-401	07/12/95	2	2.0
Ethanol, 2-butoxy-, phosphate (3:1)	26	SC-QE10-SW-301	04/11/95	2	2.0
Ethanol, nonylphenoxy-	12	SC-QE09-SW-301	04/11/95	1	1.0
Ethanone, 1-(3,3-dimethyloxiranyl)-	4.3	SC-QE07-SW-201	01/18/95	1	1.0
Formamide, N,N'-diethyl-	16	SC-QW02-SW-301	04/14/95	2	2.0
Furaltadone	4.1	SC-QW02-SW-301	04/14/95	1	1.0
Heptadecane, 4-methyl-	7.8	SC-QE09-SW-401	07/11/95	2	2.0
Hexadecane, 3-methyl-	7.9	SC-QE09-SW-401	07/11/95	2	2.0
Hexadecanoic acid	14	SC-QE09-SW-201	01/18/95	2	2.0
Hexanoic acid, 3,5,5-trimethyl-	16	SC-QE07-SW-201	01/18/95	2	2.0
Hexylene Glycol	92	SC-QE05-SW-301	04/12/95	2	2.0
Hydroperoxide, 1,1-dimethylethyl-	9	SC-QE02-SW-201	01/19/95	2	2.0

TABLE B-20
MAXIMUM DETECTED CONCENTRATIONS AND ASSOCIATED SAMPLE LOCATIONS FOR TENTATIVELY IDENTIFIED COMPOUNDS IN SURFACE WATER

Compound Name	Result	Client Description	Date Collected	Footnotes	Detection Limit
Imidazolidine, 1,3-diphenyl-2-propyl-	9.1	SC-QE10-SW-101	11/01/94	1	1.0
Methane, diethoxy-	4.7	SC-QE01-SW-101	11/02/94	1	1.0
Methanediaamine, N,N,N',N'-tetraethyl-	4.2	SC-QW02-SW-301	04/14/95	1	1.0
Morpholine, 4-ethyl-	24	SC-QW04-SW-301	04/13/95	2	2.0
Morpholine, 4-methyl-	22	SC-QW04-SW-201	01/16/95	1	1.0
Nitrogen compound	12	SC-QE10-SW-201	01/17/95		
Nonacosanol	10	SC-QW02-SW-301	04/14/95	1	1.0
Octadecanoic acid, 12-hexyl-,^methyl ester	5.7	SC-QE03-SW-201	01/19/95		
Oleic Acid	9.5	SC-QE10-SW-301	04/11/95	2	2.0
Oxacycloheptadecan-2-one	12	SC-QE11-SW-201	01/17/95	2	2.0
Oxacyclohexadecan-2-one	6.1	SC-QW02-SW-301	04/14/95	2	2.0
Oxacyclohexadecan-2-one, 16-methyl-	12	SC-QE10-SW-101	11/01/94	2	2.0
Oxygenated Hydrocarbon	23	SC-QE10-SW-201	01/17/95		
Pentanamide, N-ethyl-	18	SC-QE03-SW-201	01/19/95	2	2.0
Pentane, 1,4-dibromo-	5.8	SC-QE02-SW-401	07/12/95	2	2.0
Pentane, 2,4-dibromo-	6.1	SC-QE02-SW-201	01/19/95	2	2.0
Phenol, 4-(2,2,3,3-tetramethylbutyl)-	4.3	SC-QE11-SW-301	04/11/95	2	2.0
Phosphine oxide, triphenyl-	140	SC-QE09-SW-301	04/11/95	2	2.0
Phosphine oxide, triphenyl-	140	SC-QE10-SW-301	04/11/95	2	2.0
Phosphine oxide, triphenyl-	140	SC-QE11-SW-301	04/11/95	2	2.0
Phosphine sulfide, triphenyl-	18	SC-QE09-SW-301	04/11/95	2	2.0
Phosphine sulfide, triphenyl-	18	SC-QE10-SW-201	01/17/95	2	2.0
Phosphoric acid, 2-ethylhexyl^diphenyl ester	4	SC-QE05-SW-301	04/12/95	1	1.0
Polynuclear Aromatic Hydrocarbon	11	SC-QE09-SW-301	04/11/95		
Propane, 1,1'-[ethylidenebis(oxy)]-^bis-	6.2	SC-QE07-SW-201	01/18/95	1	1.0
Propane, 1,2-dimethoxy-	5.9	SC-QW04-SW-201	01/16/95	1	1.0
Propanoic acid, 2-methyl-, 2,2-^dimethyl-1-(2-hyd!	5.4	SC-QE05-SW-401	07/12/95	1z	1.0
Saturated Hydrocarbon: >C20	25	SC-QE02-SW-401	07/12/95		
Saturated Hydrocarbon: C10-C20	11	SC-QE05-SW-301	04/12/95		
Saturated Hydrocarbon: C10-C20	11	SC-QE09-SW-401	07/11/95		
Saturated Hydrocarbon: C10-C20	76	SC-QE09-SW-401	07/11/95		
Saturated Hydrocarbon: C10-C20	11	SC-QE11-SW-201	01/17/95		
Siloxane	8.4	SC-QW02-SW-301	04/14/95		
Tetratetracontane	4.3	SC-QE08-SW-201	01/18/95	2	2.0
Triethylamine	12	SC-QW03-SW-201	01/17/95	2	2.0
Undecane, 2,3-dimethyl-	6.1	SC-QE03-SW-201	01/19/95	2	2.0
Undecane, 4,6-dimethyl-	8.9	SC-QE10-SW-401	07/11/95	2	2.0
Unknown	300	SC-QW04-SW-101	11/04/94		

Footnotes: B = Compound also is detected in blank. J = Results below the reporting limit or is an estimated concentration.
ND = Not Detected. M = Primary Result. 1 = Tenative ID. 2 = Confident ID. z = Name longer than data field allows.